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NATIONAL FIRE PROTECTION ASSOCIATION

Quarterly

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NATIONAL FIRE PROTECTION ASSOCIATION
International

Announcing the CARDOX SMOKE DETECTOR

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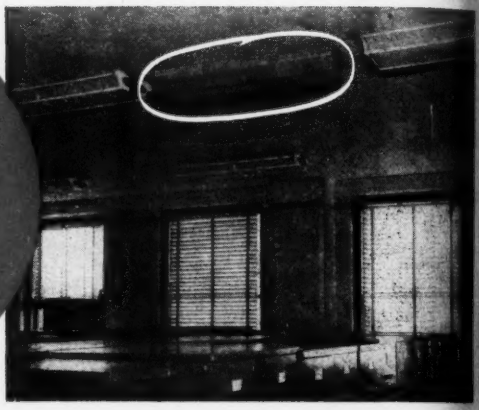

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- Simplicity of Installation
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of the

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CONTENTS

Hospital Fire, Davenport, Iowa..... Frontispiece

Davenport, Iowa, Hospital Fire..... 145

Fire Protection Developments in 1949
Percy Bugbee 147

Large Loss Fires of 1949..... 151
Manufacturing 153
Storage 159
Mercantile 163
Transportation 166
Habitational 168
Miscellaneous 170

The *Noronic* Pyre 213

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On January 7, 1950, fire took the lives of 41 women at the St. Elizabeth's Psychopathic Building of Mercy Hospital, Davenport, Iowa. Forty of these were mental patients, mostly elderly, and one was an attendant. Lack of automatic protection for the very old brick, wood-joist building, combustible interior finish, delayed discovery and alarm to the fire department and barred windows were the major factors responsible for the loss of life. The picture was taken from the northwest corner and shows about half the length of the building.

The Quarterly

Vol. 43 **January, 1950** **No. 3**

Davenport, Iowa, Hospital Fire

Fire, discovered at an undetermined time prior to 2:06 A.M. on January 7, 1950, in the St. Elizabeth's Women's Psychopathic Building of the Mercy Hospital, Davenport, Iowa, took the lives of 41 women. Forty of these were mental patients, mostly elderly, and one was an attendant. Save for the locked doors and barred windows, furred interior finish on exterior walls and partition construction, the fire was almost an exact replica of that which occurred at the St. Anthony Hospital, Effingham, Illinois, April 4, 1949, in which 74 lives were lost.

The Building

The building involved in this fire was a two-story basement and attic, brick wood-joist building 60 to 80 years old. The basement was high, making it the equivalent of a four-story building on the north side. It was a separate structure but administered as part of the Mercy Hospital, which included other buildings with the usual hospital occupancy. The structure was approximately 7,000 sq. ft., 40 to 50 ft. wide and 155 ft. long. It had two stairways, a central stairway on the west side which did not open to the outside, and one at the northeast corner with an opening to the outside at the basement level. These stairways were enclosed but the doors were of ordinary wood, thin panel type, some of which recently had wired glass panels installed in them. Whether all doors were closed at the time of the fire is unknown. There was one outside fire escape but access to it was blocked by barred windows.

Opening into the corridor was a central dumb waiter with a metal lath and plaster enclosure but a wood lining. The fire and building inspection departments had recommended metal doors at the openings to this shaft, but they had not been installed at the time of the fire. Ceilings were metal covered except in the first floor corridor, where a suspended combustible fibreboard acoustical ceiling had been recently installed. There was some plywood construction introduced in recent remodeling in the first floor lounge office and front entrance corridor but most of the interior partitions were of ordinary wood lath and plaster except for light weight pressed wallboard on wood studs in several rooms, including the room of origin. The first floor of the building was divided into patients' rooms and areas used for physiotherapy treatment. The second floor and attic were of the open dormitory type. Kitchen hazards, located in the basement, were not involved in the fire. Doors were usually kept locked between floors. Windows were provided with iron bars or heavy wire screens fastened to the wood window framing with lag screws.

The Fire

A patient undergoing periodic treatment ignited the curtains in her room on

On January 7, 1950, fire took the lives of 41 women at the St. Elizabeth's Psychopathic Building of Mercy Hospital, Davenport, Iowa. Forty of these were mental patients, mostly elderly, and one was an attendant. Lack of automatic protection for the very old brick, wood-joist building, combustible interior finish, delayed discovery and alarm to the fire department and barred windows were the major factors responsible for the loss of life. The picture was taken from the northwest corner and shows about half the length of the building.

the first floor near the fire escape in protest over being locked in her room, which was not normal treatment for this patient.

Fire is believed to have spread from the curtain to the window frame and behind the furred wood lath finish on the inside of the exterior wall to the second floor and attic. The light pressed wallboard partition ignited and the fire spread from the room into the acoustically treated corridor after the patient broke out the wired glass transom and escaped over the transom and out the front entrance. The combustible fibreboard of the corridor ceiling spread fire through the corridor of the first floor. Also contributing to the rapidly spreading fire in this structure were ancient brick chimneys with hot air flue openings at each floor, long unused but not capped at the eaves. These are believed to have spread fire rapidly to the attic space.

Two attendants were in the building at the time, one sleeping and one awake. The one who was awake died in the fire; the other escaped from the second floor by the center stairway.

Due to the locked doors, the mental condition of patients who wanted to stay in their rooms or once out of the building wanted to return, and the lack of a prearranged procedure for evacuation of the building in case of emergency, it was possible to rescue only 25 of the 64 occupants. Two of these rescued died later. Only a very short space of time was available to the firemen to get patients out owing to the exceedingly rapid spread of fire through the old building.

Just how much delay there may have been in discovering the fire and reporting it to the fire department may never be known, but the fact that the fire had extended to the upper floors when the fire department arrived is evidence that there must have been a considerable delay either in discovering the fire or in reporting it. The alarm was telephoned to the fire department from the central switchboard in the main office in another building.

The fire department on arrival found the main and second floors extensively involved. Their efforts at rescue operations were greatly handicapped by the barred windows. Chopping the bars out of wood window frames necessarily took time and delayed rescue. The fire department was responsible for saving the lives of 19 of the 23 survivors and did everything that was humanly possible, but in a building such as this with the fire so far advanced upon their arrival no fire department could be expected to prevent heavy loss of life.

Unanswered Questions

The exact details of the start of this fire are to our mind much less important than the question as to why conditions existed that permitted the rapid spread of fire from its point of origin to involve the entire building.

It is generally agreed that an automatic sprinkler system, properly installed and maintained, would have prevented this tragedy. Over a period of about twenty-five years, fire department officials had repeatedly suggested automatic sprinklers, according to the chief. Why were sprinklers not installed? Why were the benefits of sprinklers and the practicability of their installation in this building not adequately presented to the hospital management?

With the lesson of the hospital fire in Effingham, Illinois, so close at hand, why was not the combustible fibreboard ceiling at least coated with a flame retardant paint?

The fact that the fire had spread so extensively by the time the fire department arrived is conclusive evidence that there was delay in discovery or delay in giving

the alarm. Again remembering the recent object lesson of Effingham, why was there not an effective procedure for prompt discovery of fire and calling the fire department? If it were not possible to have adequately trained personnel on duty in every part of the building during the night, had consideration ever been given to an automatic fire detection system?

What about the locked doors and barred windows? These are necessary in certain types of mental institutions, but electric devices can be installed to release all locks simultaneously by the operation of a switch at a central point in case of fire or other emergency. Windows can be barred from the inside but with outside fastenings that can be quickly released by firemen on ladders.

How many more such fires must occur before hospital construction and protection reach the point where all patients in all hospitals will be reasonably safe from fire?

EDITOR'S NOTE: The information on which this account is based was obtained at the scene by James K. McElroy, Assistant Technical Secretary, NFPA. Particular acknowledgment is made of the cooperation of the Fire and Building Departments of Davenport, the office of Iowa State Fire Marshal, the Iowa Inspection Bureau and the management of the hospital. In connection with our investigation of this fire we are pleased to note close cooperation between the fire and building departments of Davenport, in advancing their common objective of safety to life from fire. Both departments are, however, handicapped by limited personnel available for inspections.

Fire Protection Developments in 1949

By Percy Bugbee, General Manager,
National Fire Protection Association

Accurate figures on loss of life and injury in fires are not yet available from any source, but there was no indication in 1949 that there was any lessening of fatal fires and we believe that our estimate of a loss of life of approximately 11,000 persons from fires annually in the United States is probably conservative.

Preliminary estimates of the property damage from fires in 1949 indicate a figure of $670,000,000. This is a 6 per cent decrease from the all-time high figure, dollar-wise, of 1948. So far as numbers of fires are concerned, while no figures are as yet available, the indications are that there was probably a slight decrease from the previous year.

The lower trend of losses was also maintained in the number of large loss fires. During the past year there were 218 fires with an individual loss of a quarter of a million dollars or more, as compared with 268 such fires in 1948. Of these, 19 were over a million dollars as compared with 33 the previous year. A careful analysis of these large loss fires indicates that buildings of excessive area, lack of automatic protection, and unprotected vertical and horizontal openings which encourage the spread of fire were the main factors. The tendency these days to decentralize industry is perhaps also a factor in that in a number of cases large factories located in areas outside of strong municipal fire protection were involved in large fires.

Fires that aroused the greatest public interest during the year were the St. Anthony Hospital fire in Effingham, Ill., on April 4, in which 74 persons were burned to death and the fire in the Canadian steamship *Noronic* at Toronto, Ontario, on Sept. 17, when over 100 died.

Civil Defense

The announcement by President Truman that Russia had developed an atomic bomb inevitably stimulated an interest in plans for civil defense. Because of the demonstrated terrible efficiency of incendiary weapons in the last war, people concerned with fire protection and fire prevention have perhaps a keener interest in and conception of the importance of civil defense planning than most others. It is devoutly hoped that before long some directive will be forthcoming from the Department of National Defense which will serve as a guide to the states and cities as to what might be expected if a foreign power were to launch an attack upon our country. Without some such guidance, planning for civil defense in the states and cities is comparatively meaningless.

Fire Departments

A recent study by the Bureau of the Census of the 397 largest cities of the country showed that these cities spent $278,000,000 for fire protection services and that this expenditure represented 9.8 per cent of the total operation expenses for the major municipal services. The study indicated that fire protection costs had increased, but that this increase was below the average increases evident in all major government functions.

The trend to shorter hours evident in recent years and throughout 1949 in the fire service has not been balanced in most cases by the appropriate increase in manpower. In very many of the cities that have shortened the work week of the fireman fire-fighting efficiency has been diminished because fewer men responded with the apparatus.

During the year considerable purchases of new fire equipment were in evidence and the shortages of equipment in many cities during and following the war have been overcome to a considerable degree. Much new fire alarm equipment was also purchased.

The program for training firemen which has been developing so rapidly in recent years continued in 1949 and the indication is that this was one of the best years for organized fire training in the United States, not alone in the number of firemen participating, but because of the improvement of fire training programs and facilities everywhere. An NFPA survey indicated that some 81,000 firemen took part in state or provincial directed fire training programs during the year (about double 1948).

An interesting new development in the training field during 1949 was the preparation of a pictorial manual on ladder evolutions by a joint committee of the National Fire Protection Association, the International Association of Fire Chiefs, and the Fire Department Instructors Conference. The success of this joint effort on standard evolutions will probably bring additional material from the same group during 1950.

We have deplored in previous annual summaries the comparatively small part that fire prevention work has played in fire department operations. The evidence of 1949 is that more and more municipal fire departments are recognizing the real importance of their fire prevention programs and the value to the citizens and to the department from such work. Perhaps the more general use of two-way and three-way radio in fire departments has been a big factor in stimulating fire prevention inspection work. In a number of cities whole companies go out on inspection and are nevertheless maintained in

active service through the use of radio. In every city, large or small, the firemen should carry on inspection work if for no other reason than to become familiar with the properties in which some day they may have to fight a fire. In nearly all of the larger cities and in many smaller cities today a separate fire prevention bureau is maintained in the fire department to direct inspections and to handle the more complicated inspection activities.

The majority of our fire departments have still failed to attack the biggest inspection problem of them all — the private home. Cities that have carried on home inspections by the firemen on an annual or semi-annual basis have shown remarkable reductions in dwelling fires and the departments have gained a very substantial amount of public good will from the activity at no extra cost to the taxpayers. The fire department in every city should carry on a home inspection program.

Municipal fire administrators were very much interested in the *Fire Department Act* enacted in the Province of Ontario in 1949, which provides provincial treasury funds to the communities in the province for fire apparatus. The Ontario act provides for a maximum 72-hour work week for paid firemen and opens the way to standardization of fire apparatus and equipment and of fire training procedures in the province.

Legislation

During 1949 there was a considerable wave of legislation in the cities controlling the hazard of the careless smoker. A number of cities prohibited smoking in such occupancies as department stores and theatres and it is becoming relatively common to call to account legally the person who carelessly sets fire to a hotel room because of a discarded cigarette or match. The American public is slowly coming to realize the very sizable but needless toll of deaths, injuries and property losses from the careless disposal of cigarettes and matches. Last year for the first time some of the largest cigarette companies indicated an appreciation of their interest in this problem and we are hopeful that 1950 will see a considerable extension of this interest and support.

During the past year a joint Committee on Unification of Building Codes, made up of representatives of ten national organizations concerned with the writing of building codes, has been quietly at work in an attempt to agree upon fundamental definitions that could be accepted by all building code writing authorities. This work holds great promise, as there has been the utmost confusion and confliction in building code writing practices throughout the country.

In municipal fire legislation there has been conflict in many cities as to the exact area of authority and jurisdiction between the city building department and the city fire department. The NFPA is currently encouraging a conference between the leaders from the city building officials and city fire marshals to resolve these conflicts and to arrive at a clear understanding as to the appropriate areas of operation for each group. We believe that this will be a distinct contribution.

Minnesota joined the states that have authorized the establishment of township fire districts on vote of the people within the district concerned. A number of states have had such legislation and have found it effective in providing more adequate fire protection for the farm and rural areas.

New Standards

A number of new fire protection standards of general interest were adopted by the National Fire Protection Association during 1949. A series of amendments to the 1947 edition of the National Electrical Code were adopted and a 1949 edition published. A new edition of the National Building Exits Code was also adopted and published. A new standard on the protection of hospital operating rooms appeared and has been very widely in demand. New specifications for the common types of municipal fire apparatus have been issued and have been harmonized with similar specifications issued by the International Association of Fire Chiefs. A new code on the protection of places of outdoor assembly (grandstands, tents, etc.) has been issued. Tentative standards on the use of wetting agents in fire fighting have appeared and two controversial standards have been suggested but are still in the formative stage — one on aircraft rescue and fire fighting equipment for airports, and the other on self-service gasoline stations. Considerable progress was made during the year in the adoption by more than fifty port cities of a uniform ship fire signal (five prolonged blasts).

Education

Fire preventionists have been encouraged during the past year by the remarkable increase in demand for general information and educational literature on the simple fire hazards and how to control them. Millions of pieces of educational material designed for the use of school children and for adult education have been distributed and there is a growing interest in and acceptance of the importance teaching the elements of fire prevention existing courses in the public schools.

Fire Prevention Week continues in gre popularity as a device to stimulate publ interest in fire prevention work, and t contest run by the NFPA Committee Fire Prevention and Clean-up Campaig for Fire Prevention Week in 1949 dre participation from 3762 American an Canadian municipalities. Memphis, Tenn emerged as the winner of the contest i the United States, with Arvida, Quebec, a the winner in Canada. Other cities wit very high ratings in the contest were For Collins, Colo., Fort Wayne, Ind., Chicago Ill., Louisville, Ky., Jersey City, N. J., Lo Alamos, N. M., New York City, an Providence, R. I.

Winners in the 1948 Fire Waste Con test for year-round excellence in fire pre vention activities conducted by the Na tional Fire Waste Council of the United States Chamber of Commerce were Chi cago, Memphis, New Haven, Decatur and Moline, Ill., and Fort Collins, Colo., with Memphis emerging as the grand winner.

With Memphis taking the top honors in both national contests, perhaps we can expect delegations of fire preventionists from other cities visiting Memphis to see how it is done. Certainly no city has shown the all-around widespread public interest in fire prevention that the plan ners in Memphis seem to be able to create.

The year 1949 was a year of great growth and progress for the National Fire Protection Association and the demand for its services, its technical standards and its publications reached the peak of its 51 years.

Large Loss Fires of 1949 and Their Lessons

A Staff Study

By analysis of the 218 large fires of 1949 in the United States and Canada, valuable lessons can and should be learned. These fires, each causing loss of $250,000 or over, affected a wide diversity of property types, and the lessons they teach can be applied to properties in almost every occupancy class.

It is pleasant to report that there was a healthy reduction in the number of "large loss" fires during 1949 as compared with the peak year of 1948 (see Table No. 1, page 152). As opposed to 1948's 268 fires of a quarter-million or over, which resulted in a loss of $141,497,000, the 1949 record of 218 fires with a total estimated loss of $121,191,500 shows an 18.3% reduction in the number of such fires and a 14.1% reduction in the total dollar losses.

Taking confident reassurance from these figures is, however, dangerous, since the reductions evident from the statistics do not take into consideration the slight downward trend in building and contents values occurring during 1949. The number of "border line" fires (originally reported as being over $250,000 but subsequently reduced below that mark by careful checking of property losses) numbered over 150. Had these been included, the totals would have shown an increase of almost 37% in the number of "large loss" fires instead of the announced decrease.

Special comment is perhaps pertinent with respect to the loss figures assigned to these fires in the list on pages 153 to 173. Every effort has been made to check and double check the estimates given, but despite these efforts the loss figures are intended to show *only* the general magnitude of the damages sustained by these fires. The figures include business interruption and rents insurance losses where indicated by a "†" after the estimate. All other loss figures are intended to show insured and uninsured actual property damages based on reliable estimates supplied by our interested membership and cooperating agencies.

The $95,381,500 structural losses (excluding transportation losses) represent about 13.3% of the estimate aggregate fire losses in such property in the United States and Canada during 1949. The preliminary total loss estimates for *all structural* fires in both countries is $720,000,000, a 6% reduction from 1948. No overall loss figures for transportation fires (aircraft, marine vessels, railroad stock, and motor vehicles) are available.

Acknowledgment

It is only possible for the NFPA to present this study because of the loyal support of its members who have supplied, without financial remuneration, reports on major fires occurring in their localities. Our appreciation for their help is most sincere.

Many fires reported in the press at the time they occurred as involving losses in excess of $250,000 are not included in this article. Over 150 such fires have been eliminated based on revised estimates supported by authenticated subsequent data. Other losses, originally reported less than $250,000, have been included because of later upward revision.

Since this type of study is planned as an annual feature of our January QUARTERLY, all NFPA members and readers are urged to volunteer reports on fires about which they have information.

Table No. 1
PRINCIPAL OCCUPANCY BREAKDOWN

	No. of Fires by Years			
	1949	1948	1947	1946
Manufacturing	67	92	64	58
Storage	43	52	45	44
Mercantile	26	36	26	24
Transportation	23	20	22	20
Habitational	11	9	6	11
Miscellaneous	48	59	39	30
Totals	218	268	202	187

Compared with 1948, there was a shocking *increase* in fatalities resulting from these large fires. In 1949 there were 416 fatalities (see Table No. 2, page 208) in the 218 fires, while in 1948 there were 224. This increase was principally the result of the S.S. *Noronic* fire, where 104 were killed and 14 missing (presumed dead), and the tragic St. Anthony's Hospital fire which took the lives of 74 persons.

Tables

In the tables starting on page 208 we present some of the more pertinent statistics concerning the 195 major fires involving structures. The reader is urged to study this material and to apply the obvious lessons indicated to properties under his jurisdiction.

Other Observations

Geographically, large loss fires occurred in 38 of the 48 states in the U. S. A. and in six Canadian Provinces. The largest number of big fires occurred in Illinois (19), California (18), New York (14), New Jersey (13) and Ohio (11).

Sixty-two per cent of all the fires occurred during hours of darkness, an increase of 5.7% over 1948 experience. This increase was mostly manifest in manufacturing plants, where 55% of the fires occurred during non-operating periods in 1949 as opposed to 48% in 1948. This is undoubtedly influenced by the reduction in working hours.

Approximately two-thirds of the fires were reported by telephone and only 10.2% of the alarms came in via street box alarm systems. In twelve instances the alarm transmission by telephone was delayed because of burned wires, difficulties using party, pay or dial phones, or because of the inaccessibility of a telephone.

In 18 cases observers of incipient fires delayed the alarm while making attempts to fight the fire with hand appliances, and in 5 other instances the alarm was delayed while observers investigated smoke before calling fire department assistance. In six cases, bystanders failed to give the alarm, assuming the fire department had been notified when actually no alarm had been given.

While 59.5% of the fires started from unknown causes, 26.2% could have been prevented if the hazard responsible for the fire had been properly safeguarded, and in 11.8% human carelessness was responsible. Five of the fires (2.5%) were suspicious or proven incendiary fires.

In the non-operating properties involved, 53.8% did not have watchman services and an additional 12.4% had only non-standard watch service. While 26.4% of the plants had standard watchman protection, only 13.8% of the fires were initially detected by a watchman (see Table No. 3, page 208), indicating the need for improved watchman training and better, more responsible personnel for this important task.

Editor's Note

Since preparation of this article four additional large loss fires have been reported. They are:

Aug. 6 Payette National Forest, Idaho, $263,500.

Aug. 18 Payette National Forest, Idaho, $624,000.

Dec. 6 Carthage, N. C., Smothers, Bros., $425,000.

Dec. 28, Monroe, Mich., Consolidated Paper Co., $264,500.

U. S. AND CANADIAN LARGE LOSS FIRES BY OCCUPANCY CLASSIFICATION

*Indicates "group" fire (spread to other structures).
†Includes business interruption insurance loss payments.
††Does not include business interruption loss, which is unestimated.

MANUFACTURING

Brick, Tile and Pipe Plants

Jan. 9 — Kilgard, B. C. — Clayburn Co. — $506,000
Bricks, tile, sewer pipe. Detection by watchman; lack of sprinklers and fire divisions in 2-story wooden building. No local fire department or private fire brigade.

June 29 — Barberton, Ohio — American Vitrefied Products Co. — 765,000
Clay and concrete sewer pipe. Suspicion of arson. Watchman failed to detect. Discovered by outsider at 12:59 A.M. Non-standard obsolete sprinkler equipment ineffective. Vertical spread through open stair wells and cracks in wooden floors.

Aug. 16 — Cooksville, Ont. — Cooksville Company — 288,500
Brick and tile. Fire originated in drier; not immediately reported as watchman and employees fought fire, delaying alarm. Spread to exposed building of inferior construction. Mutual aid called.

Chemical Plants

Mar. 1 — Nitro, W. Va. — American Viscose Corp. — 268,000†
Rayon manufacturing. Explosion of waste flammable liquid vapors in 78-in. diameter sewer. 500 ft. of sewer collapsed. Water from sewer backed into building and flooded 22 motors.

May 4 — near Dover, Ohio — W. C. Hardesty Chemical Co. — 730,000†, 1 killed
Organic acids and benzol derivatives. Explosion of flammable vapors killed employee and damaged 3000 sq. ft. 1-story building. Forty sprinklers held ensuing fire in check.

July 15 — Chattanooga, Tenn. — Tennessee Products and Chemical Corp. — 400,000†
Insecticide manufacturing. Explosion of benzol vapors escaping from benzene hexachloride still. Two noncombustible buildings severely damaged by explosion. Employees escaped before explosion.

Distillery

Sept. 13 — Peoria, Ill. — Hiram Walker & Sons, Inc. — 600,000†, 2 killed
Two employees killed by explosion of alcohol vapors released from aldehyde still seal that discharged inside building. Electric spark probable igniting source. Roof blown off and all windows blown out.

Electric Generating Plants

April 15 — Iola, Kans. — Lehigh Portland Cement Co. — 250,000†
Diesel electric generating station. Leak from oil tank ignited by centrifuge motor. Power for plant fire pumps cut off by fire. Asbestos board roof sheathing retarded flame spread.

Aug. 7 — East Peoria, Ill. — Central Illinois Light Co. — 600,000
Damage almost entirely due to explosion. Oil discharged, because of employee error, into hot boiler vaporized and exploded. Building of fire-resistive construction, six stories high, 56,268 sq. ft. ground floor area. One fireman injured.

Sept. 15 — Rushville, Ind. — Southeastern Indiana Power Co. — 250,000, 2 killed
Overheated bearing in crank case caused oil to vaporize and explode. One wall and roof collapsed in the 15,000 sq. ft. fire-resistive structure and two occupants killed by falling structural members; three escaped. No fire ensued.

Food Products Plants

Jan.	21	North Chicago, Ill.	National Cranberry Assn.	$300,000
		Processing, canning and boxing cranberry jelly and jam. Inadequate furnace clearance cause of fire in combustible furnace room. Fire spread beyond boiler room by means of combustible fibreboard conveyor.		
Jan.	25	Saltair, Utah	Morton Salt Co.	482,000
		Salt refining and packaging. Employee smoking probable cause; open stair and elevator shafts; private fire brigade not properly trained; electric fire pump stopped when master switch pulled by mistake.		
Feb.	24	Fairbury, Ill.	Honegger & Co.	390,000
		Mixed live stock feed; auxiliary elevator and retail store. Watchman failed to discover fire which was beyond control in upper part of elevator when noticed by outsider. No sprinklers or automatic detection equipment. Fire spread through open stair and stock conveyors.		
Mar.	5	Milton, Ore.	F. G. Lamb & Co.	364,500
		Frozen fruits, vegetable and chicken processing. Originated in 1-story large-area combustible section and spread through unprotected openings into first floor of connecting 3-story fire-resistive section. Spread to upper floor of fire-resistive section through open stairwells.		
*Mar.	23	Richmond, Va.	Dixie Portland Flour Mills	860,000
		Originated near hammer mill on sixth floor of unsprinklered building. Flour dust contributed to fire spread; open stair and elevator shafts. Spread to exposure through ordinary glass windows.		
April	30	Dr. Phillips, Fla.	Dr. P. Phillips Co.	295,000
		Fresh fruit packing. Fire in small packing shed outside unsprinklered main building detected by company official at 6:30 P.M. Fire brigade held in check until hose section burned off. No local public fire department, but Orlando and neighboring towns responded to alarms. The previous night fire destroyed $100,000 fertilizer plant.		
July	29	Roxobel, N. C.	Bertie Peanut Co.	300,000
		Peanut shelling. Discovered by outsider at 11:00 P.M. in 1-story storage section attached to 5-story plant. No automatic sprinklers, watchman or public fire department.		
Aug.	11	near Merced, Calif.	Sunset Products Co.	300,000
		Fruit canning. Discovery by outsider at 9:25 P.M. Public telephone in use caused delay in alarm transmission. No watchman or sprinkler protection. Insufficient fire department equipment and water.		
Aug.	23	Columbus, Ohio	Continental Grain Co.	250,000
		Solvent process soybean oil extracting. Escape of hexane vapors from seal on outdoor extraction unit. Ignition by welder's torch in use nearby. Steam snuffing system on unit ineffective.		
Aug.	25	Onarga, Ill.	Onarga Canning Co.	528,000
		Corn, asparagus and kidney beans. Large area, one and two-story brick and brick veneer structure with 52,818 sq. ft. ground floor area. Delayed detection; no automatic protection; small town fire department; delayed alarm transmission.		
Sept.	17	Cashmere, Wash.	Cashmere Fruit Growers Union	595,000
		Fruit packing and cold storage warehouse. A 1500 ft. by 60 ft. unsprinklered structure lacking sufficient fire division walls and lacking wings and adequate parapets on the fire walls provided. Wood loading platform spread fire around walls. Watchman performing other assigned duties when fire discovered by outsider. Delayed alarm at 4:20 A.M.; telephone not accessible.		
*Sept.	22	Denver, Colo.	Crescent Flour Mills	500,000
		Flour mill. Incipient fire reported via automatic detection equipment providing prompt response of fire equipment. Employees apparently not properly trained in use of hand extinguishers and their improper use spread fire. Entire 5-story building gutted; exposed elevator involved.		

Food Products Plants (Cont'd)

$300,000 *Oct. 2 near Champaign, Ill. Pioneer Hi-Bred Corn Co. of Illinois $575,000 1 killed
Seed corn. Corn shelling, grading, drying. Employees believed they extinguished fire at switch panel on first floor, but flames had gained access to second, and alarm was not sent until fire gained tremendous headway on upper floor. Spread to adjacent building because of inadequate separation, inferior construction. Limited water supply, no sprinklers. Fireman overcome by smoke, died at hospital.

482,000 Nov. 17 Jersey City, N. J. General Foods Corp. 250,000†
Cocoa products manufacturing and storage with laboratories and offices. Ignition of cocoa products adhering to walls of drier at basement level. Drier extended through all floors of 6-story 3,250 sq. ft. building.

390,000† Nov. 26 Frankfort, Ind. Milner Provision Co., Inc. 250,000
Meat packing. Overheating and ignition of grease in smoke house. Delayed alarm as watchman attempted to fight fire with hand extinguishers. No automatic protection; unprotected vertical openings; inadequate public water supply; large undivided attic.

364,500 Dec. 14 Sioux City, Iowa Swift & Co. 500,000 21 killed
Packing house and offices. An explosion of accumulated natural gas in the basement of a 6-story fire-resistive building. Gas apparently leaked from crack in 16-inch pipe line under railroad spur near building.

860,000†

Gas Works

295,000 Jan. 28 Chicago, Ill. Peoples Gas Light and Coke Co. 375,000 1 killed
Water gas manufacturing. Explosion of gas leaking because of mechanical failure of automatic valve. Inadequate explosion venting provision. Employee killed by explosion.

Lamp Shades

300,000 Nov. 2 Cleveland, Ohio Phil-Mar Corp. 365,000†
Portable welding torch sparks ignited flammable vapors near dip tank and spray booth operations. Employees nearby succeeded in extinguishing fire with 50 lb. CO_2 and eight other hand units, but lost control at final effort. Alarm to fire department delayed until fire spread beyond control. Partial sprinkler protection overtaxed.

300,000

Metalworking, Heavy

250,000† Mar. 31 St. Paul, Minn. Western Fruit Express Co. 300,000
Building and repairing railway refrigerator cars. Originated in paint shop. Large area combustible building without fire division walls; paint residue on walls; inadequate hydrants.

528,000† *Sept. 4 Belleville, Ill. Oakland Foundry Co. 254,000
Furnace and stove works; tool and die shop; tin shop; dwelling. Plant not operating, detection delayed, no automatic protection, insufficient fire divisions, inadequate building separation. Fire department pumper in accident en route to fire. Watchman hard of hearing; could not use telephone properly.

595,000 Nov. 18 Cicero, Ill. Kropp Forge Co. 580,000†
Drop forging and machine shop. Ignition of oil in quench tank overheated by frequent immersion of hot castings. Manually operated fixed carbon dioxide system unable to control because of partial depletion prior to fire. Fire jumped to wood roof of unsprinklered building. Castings on skids around nearest hydrant prevented use by pumper.

500,000 *Dec. 3 Sedalia, Mo. Missouri Pacific Railroad 290,000
Railroad car reclamation. Not operating; plant fire department not on duty; watchman's alarm delayed as he ran two blocks to telephone city fire department; traffic delayed response (three-mile run). No sprinklers in 30,420 sq. ft. building of combustible construction. Fire originated in congested yard storage.

Metalworking, Light

Jan. 12 Belleville, N. J. L. & B. Products Co. $325,000†
Restaurant and bar room furniture. Fire discovered by outsider, although watchman protected premises. Open stair and elevator shafts; no barriers to horizontal spread.

Jan. 23 Seattle, Wash. Puget Sound Sheet Metal Works 754,000†
Sheet metal worker. Current overload on inadequately fused circuit. Insufficient hydrants.

Mar. 17 near Toledo, Ohio Prestole Corp. 318,000†
Small fastener manufacturing and sheet metal works. Fire beyond control when discovered by outsider at 3:19 A.M. No automatic protection, fire divisions or enclosures for stairs and elevator shafts.

Mar. 28 Bethayres, Pa. H. W. Butterworth & Sons Co. 300,000†
Rayon spinning machinery. Fire in unsprinklered wooden building used for large value storage and spray painting. Other buildings not involved were sprinklered. Fuel oil salamander tipped over by wind.

Mar. 29 LeRoy, N. Y. Union Steel Chest Corp. 1,268,000†
Metal tool chests and fishing tackle boxes. Fire in naphtha-thinned lacquer at dip tank controlled, but drain boards tipped toward tank allowing sprinkler discharge to overflow tank. Overflow discharged on ground outside building. Reignition of overflow; fire re-entered building at third floor windows, and spread as sprinklers had been turned off. Headway gained by fire then overtaxed sprinkler water supply when sprinklers were turned on again.

Mar. 31 St. Joseph, Mich. Paramount Die Casting Co. 250,000
Aluminum alloy castings. Rupture of high pressure oil line sprayed flammable hydraulic fluid over hot die casting machinery. Fire jumped to wood roof of unsprinklered building.

April 18 Chicago, Ill. Hansell Elcock Co., et al. 558,000†
Iron foundry; storage of patterns and iron castings; office; bagging and storing molding sand. Oil-fired salamander tipped over on loading platform. Fire entered unsprinklered 1-story building through open loading door and spread rapidly over paper bags and shellacked patterns. 13-minute delay in alarm as employees fought fire with hand extinguishers.

May 3 Crestline, Ohio Schill Furnace Mfg. Co. 266,500†
Furnaces. Delayed detection by outsider at 3:20 A.M. No automatic protection or watchman; open stair and elevator shaft combined three floors into single fire area of 66,172 sq. ft.

*May 24 Lockport, N. Y. Aluminum & Brass Co., et al. 312,000
Foundry and machine shop, school, feed warehouse. Cutting oil (flash point 260°F.) ignited at automatic screw machine. Unsprinklered building. Fire entered school separated by 12 ft. alley through plain glass window. Sparks ignited roof of adjoining seed warehouse.

Aug. 17 Southfield Twp., Mich. Weltronic Co. 250,000
Electrical equipment. Fire discovered by outsider; watchman asleep. Alarm delayed as watchman first pushed delivery truck out of building, leaving door open, which increased draft to fire. Lack of sprinklers. Paint locker room saved by fire door and concrete block partition.

Sept. 7 Beloit, Wis. Taylor Freezer Corp., et al. 284,000
Ice cream freezing units. Gas hot water heater explosion. Leaking city gas and oil-soaked floors contributed to fire spread through the 2-story building without fire division or stairwell enclosures.

Nov. 20 Detroit, Mich. Herron-Zimmers Moulding Co. 1,255,000†
Metal trim for auto bodies. Delayed detection by watchman, who was forced to detour shipping department because of excessive storage. Fire confined to 44,800 sq. ft. (⅓ of total area) of unsprinklered building by fire department despite handicap of no yard hydrants and high fence around plant necessitating long hose lays. Unprotected steel framing collapsed.

Metalworking, Light (Cont'd)

Dec. 4 Glen Riddle, Pa. Sunroc Refrigeration Co. $500,000††
Water coolers. Detection by watchman of fire on second floor of 4-story sprinklered building at 2:30 A.M. Wrong fire department called first. Watchman unable to start fire pump. Reason for unsatisfactory sprinkler performance under investigation.

Mining Properties (see also Coal Mine, Miscellaneous)

Jan. 1 Helen Mine, Ont. Algoma Ore Properties 294,000†
Mine surface building for iron ore processing. Sprinklers shut off during installation of new water main. No emergency steps taken during impairment of sprinkler protection. No watchman stations inside building of origin.

*May 2 near Shinnston, W. Va. Bethlehem-Fairmont Coal Co. 316,500†
Coal mine tipple, machine shop and mine supply house. Sparks from acetylene torch ignited coal dust and oil under a wooden enclosed conveyor. Spread through conveyor; congested combustible construction; inadequate water and hydrants.

Miscellaneous Manufacturing

Feb. 2 near Montgomery, Ala. U. S. Air Force 352,000
Carpenter, paint, plumbing and electrical shops; office. Watchman did not detect. Fire originating in blue print room of large-area 1-story unsprinklered building discovered by outsider. Burned telephone and fire alarm system wires delayed alarm transmission. Fire spread through concealed roof space.

Paper Products Plant

Mar. 22 Riverbend, Que. Price Brothers & Co., Ltd. 324,000†
Eight 2,500 h.p. motors and one 5,000 h.p. motor on grinders severely damaged. Electrical disturbance caused by high winds and ice conditions fused starter bars and induced sufficient heat to cause fires in motors. No damage to building. Fire fought by mill brigade with foam, carbon tetrachloride, inert gas and 40,000 gallons of water.

Textile Workers

*Jan. 9 New York, N. Y. Miller Brothers Hat Co., et al. 372,000
Hats, belts, pants and other garments. Not operating; no facilities for prompt detection and extinguishment of basement fire. Spread to exposure through ordinary glass windows.

Feb. 8 San Francisco, Calif. Sun Tent Luebbert Co. 378,000
Manufacture and storage of tents and other canvas articles. Arson suspected. No automatic protection or watchman. Top two floors completely involved 20 minutes after closing time.

April 20 Paterson, N. J. Rosenstein Brothers 359,000†
Silk mill. Fire originated in overheated motor of loom; five sprinklers held fire in check; first aid appliances extinguished fire. Water damage from continued sprinkler operation to loom and lower floors because employees could not turn off valve; wrench missing.

*July 4 Los Angeles, Calif. Los Angeles Felt Co., et al. 250,000
Cotton and fibre felting. 1,276 bales of cotton, 52 bales assorted fibres and one building destroyed. Three roofs damaged. Sparks from incinerator probable cause of fire originating in yard-stored baled cotton adjacent to building. Sparks ignited lint on roofs of neighboring buildings. Lint had been discharged into open from cyclone collector.

*Nov. 2 Bridgeton, N. J. Martin Corporation 644,000
Cotton cloth dyeing and finishing. 400,000 yards of cloth in plant. Origin: static spark ignited solvent at waterproofing treatment drier. Combustible construction, no automatic protection, no organized fire brigade, inadequate separation from exposed buildings; small town fire department with inadequate equipment, manpower and water supplies to cope with fire of this magnitude.

Tobacco Factory

Dec. 15 Greeneville, Tenn. Burley Suppliers, Inc. $280,000
Tobacco redrying plant. Overheating of tobacco redrying machine. Fire spread rapidly over dry tobacco stored in the 81,500 sq. ft. undivided and unsprinklered 1-story building.

Woodworking, Saw and Planing Mills

*Mar. 10 Picayune, Miss. Goodyear Yellow Pine Co. 608,500
Dry kiln, planing mill and box factory with detached lumber yard. Eleven freight cars. Watchman fought fire discovered on 1:00 A.M. tour with first aid equipment and did not call private or public fire departments. On 2:00 A.M. tour found fire beyond control. No automatic protection. Congested combustible buildings.

April 29 Ironwood, Mich. Roddis Lumber & Veneer Co. 270,000
Sawmill, yard storage of logs and lumber, two freight cars. Sparks from cutting torch believed to have fallen into cracks in wood flooring and ignited accumulation of oil and grease beneath floor. Smoke odor noted for six hours before employees investigated.

*June 15 Vancouver, B. C. Bates Sawmill, et al. 353,000
Saw and planing mill and adjacent properties in industrial section. Fire did not spread beyond normal fire barriers. Discovery by outsider after fire out of control in sawmill. Congested district, inferior combustible construction.

July 27 Springfield, Ore. Clear Fir Forest Products 255,500
A large dusty structure of 44,800 sq. ft. floor area open sided with wood roof. Fire discovered by railroad crew during non-operating period. Flames spread to yard storage of lumber and logs (estimated 600,000 board feet). Inadequate fire hydrants; high wind.

July 30 Vaughn, Ore. Long-Bell Lumber Co. 250,000
Saw and planing mill. Although the mill in which fire originated was destroyed, other seriously exposed buildings were saved by the well-designed system of plant fire protection including adequate equipment and a trained brigade. No public fire department.

Woodworking, Wood Products

*Feb. 1 Hazleton, Pa. Hazleton Planing Mill, et al. 525,000
Doors, window frames and sashes. Spread to multiple occupancy warehouse. No automatic protection. Beyond control when discovered at 11:20 P.M. No fire divisions in building of origin; no exposure protection for adjacent warehouse.

May 1 Medford, Wis. Hurd Millwork Corp. 774,000†
Doors and sashes. Overheated engine driven generator. Undivided 30,000 sq. ft. fire area; dust. Sprinklers did not control; hazard too severe for system as installed; quick opening device out of service.

*May 24 Elwood, Ind. Hubbard Spool Co., et al. 471,000†
Commercial spools; lamps; metal stamping and tools. Delayed detection at 3:30 A.M. by outsider. Fire originated on ground floor of unsprinklered 3-story spool manufacturing plant; spread to exposures through plain glass windows.

June 27 Hightstown, N. J. Diamond Brothers Co. 500,000
Furniture factory with upholstering. Delayed detection, no automatic protection, no watchman, insufficient fire department equipment and lack of adequate water supply. Drums of lacquer exploded during fire.

Sept. 21 Rochester, N. H. W. H. Champlin Co. 671,000
Box factory. Originated near motor in basement of 52,500 sq. ft. undivided 1-story wooden building. Sprinklers unable to control because hazard of occupancy too severe for ordinary dry pipe system as installed; insufficient water for sprinklers and hose streams; no quick opening devices on dry pipe valves; obstructed sprinkler piping. Wood dust contributed to rapid spread.

Woodworking, Wood Products (Cont'd)

$280,000†

*Sept. 24 Charleston, S. C. Woodstock Mfg. Co., Inc. $259,500†
Boxes and cable reels. Exposure damage to office building. Originated in refuse in under-floor unsprinklered area out of range of sprinklers in 1-story wooden building. Fire discovered by outsider, although supervised watchman followed his assigned route through the plant.

608,500

*Dec. 6 near Great Bridge, Va. Richmond Cedar Works 560,000†
Furniture factory and planing mill. No public protection. Insufficient private protection. Combustible construction of 52,900 sq. ft. area. Delayed detection. Telephone line busy, delayed alarm. Combustible conveyor interconnecting buildings and congested yard lumber storage aided fire spread to other structures.

270,000†

Total Manufacturing Losses: $29,268,500
28 killed

STORAGE

Cold Storage

353,000

June 22 Medford, Ore. Pinnacle Orchards and Packing Co. $261,500
Fruit storage. Cork insulation ignited by cutting torch sparks burst into flames after plant closed and unoccupied. Fire discovered by police at 2:00 A.M. Blank walls prevented effective use of fire department hose streams and wooden air conditioning ducts spread flames from basement to top (3rd) story and through fire wall.

255,500

June 28 Salt Lake City, Utah Utah Ice and Storage Co. 923,000†
Fire originated in a refrigerated candy storage room from a short circuit in substandard wiring; spread throughout the high 3-story brick veneer, 13,585 sq. ft. (ground floor), windowless cold storage plant. Delayed detection, alarm, and response (wrong address given over phone), plus sawdust filled concealed spaces (vertical and horizontal) and light wood interior construction doomed the building.

250,000

*Dec. 25 Fort Myers, Fla. City Ice and Fuel Co. 250,000
Gladiola bulb storage. Delayed detection, with discovery by an outsider at 5:15 A.M. Cork insulation and explosion of ammonia tanks contributed to fire spread; windowless building prevented effective use of hose streams. One 160-lb. ammonia tank thrown over 650 ft. by explosion.

525,000

Cotton

774,000†

Jan. 23 Pinedale, Calif. Pinedale Compress and Warehouse Co. 1,100,000
55,000 sq. ft. cotton warehouse. Automatic sprinkler protection rendered inoperative by closed valve to prevent freezing; watchman inexperienced and did not open sprinkler valves when fire detected.

471,000†

Jan. 30 Houston, Texas Ship Channel Compress Co. 450,000
Baled cotton valued at $400,000 destroyed. Water supply to sprinklers turned off to prevent freezing; old, incapacitated watchman did not know sprinklers were shut off and was not familiar with valves; spread to adjoining section through sawtooth skylights and around fire wall.

500,000

*Oct. 21 Seymour, Texas Seymour Compress and Bonded Warehouse, et al. 659,000
3,376 bales of cotton fire damaged. Watchman delayed investigating smoke odor and when fire broke out telephone was out of order, causing additional delay. Lack of automatic sprinklers, insufficient water supplies and lack of fire divisions handicapped fire fighting. Fire packed bale.

671,000

Electrical Equipment

Mar. 10 New York, N. Y. Electrolux Corp. 2,100,000
Vacuum cleaner parts, garment bags and paper cartons. Stock wrapped in paper and in burlap piled 20 ft. high, with inadequate aisle spacing and stock subdivision. Lack of automatic protection and unprotected door openings allowed fire to spread over 35,200 sq. ft. floor area.

Electrical Equipment (Cont'd)

Mar. 23 Little Rock, Ark. O'Bannon Brothers Electrical Supply Co., et al. $329,000
Large loss fire in fire-resistive building, mostly contents. Stock stored to ceilings and walls; inadequate aisles; stock blocked windows, hampering application of hose streams; locked metal doors handicapped access by fire fighters; toxic gases from chemicals (methyl chloride, carbon disulfide, freon); no automatic protection.

Fibre

Aug. 30 St. Louis, Mo. F. Burkart Manufacturing Company 250,000
Baled cotton, jute and sisal. High piling of stock obstructed effective sprinkler distribution. Flame spread caused opening of so many sprinklers that deficient public water supply was not adequate. One-story, 45,000 sq. ft. building was a single fire area; poor stock subdivision.

Food Products

Jan. 12 Freewater, Ore. Utah Canning Co. 839,000
Canned peas in storage. Overheated stove chimney ignited wood roof members; town and private water pumps knocked out as fire burned power lines; fuse on town siren blew out, delaying arrival of volunteer fire fighters.

Feb. 11 Rock Island, Ill. Illinois Wholesale Grocery Co. 275,000
Canned goods, sugar, paper stock and other supplies destroyed. Fire discovered by police at 12:58 A.M.; no automatic protection; no watchman; fire started in basement, spread to two upper floors via elevator shaft with unprotected openings.

June 3 Detroit, Michigan W. H. Edgar and Son, Inc. 570,500
An unsupervised rubbish fire spread to the wooden underpinning of this one-story sugar, grocery and general merchandise warehouse. Delayed detection, heavy storage in single fire area, insufficient fire division walls and lack of automatic protection.

Aug. 29 Sylvester, Ga. Sylvester Peanut Co. 325,000
A large area (12,000 sq. ft.) structure without fire subdivisions or automatic sprinklers storing 1,300 tons of peanuts destroyed. Fire went undiscovered until 3:30 A.M., when noted by an outsider.

Aug. 30 San Francisco, Calif. Safeway Stores, Inc. 2,750,000
Automatic detection equipment functioned properly to give the central station alarm, but lack of sprinklers prevented prompt extinguishment. Fire department operations impeded by blank walls, locked doors and lack of venting facilities. About 112,000 sq. ft. of 222,000 sq. ft. floor area was involved as substandard fire doors failed.

*Nov. 24 Stephenville, Tex. Swift & Co., et al. 375,000
17,500 tons of peanuts, hull house, box cars, tool shop. Tramp built fire in yard undetected by watchman. Fire spread into building; small explosion of peanut dust; inferior combustible construction. Lack of automatic protection.

Furniture

Jan. 20 Newark, N. J. *Christian Schmidt Furniture Co.* 292,000
Storage of new furniture and household appliances. No watchman service; detection by outsider; no automatic protection; unprotected vertical openings; unprotected doorways in fire division walls.

Sept. 4 Los Angeles, Calif. Gold Furniture Co. 250,000
Lack of automatic protection permitted fire in this 125 ft. by 150-ft., 2-story warehouse building to remain undetected until noticed by outsiders at 11:48 P.M. New furniture in storage destroyed as fire fighters were handicapped by blank walls, locked doors, heavy smoke.

General

Feb. 20 Vancouver, B. C. Coast Warehouse Co. 345,000
Miscellaneous storage. Property lacked automatic detection or extinguishing equipment; no watchman service; detection by outsider; icy roads slowed fire department response.

General (Cont'd)

Aug. 30 Billings, Mont. Baker Warehouse and Terminal Co. $315,000
Household furniture, refrigerators, telephone equipment, etc. Boys playing under loading platform ignited straw. Flames spread into building through unprotected conveyor opening. Lack of sprinklers, open stairs and elevator shaft and delayed alarm transmission prevented effective control. Improper type fire extinguisher used by occupants prior to fire department notification.

Glassware

May 4 Corning, N. Y. Corning Glass Works 250,000
Glassware in wood boxes, wood racks and paper cartons. Employees fought the fire with five-gallon water pump extinguishers and delayed transmitting alarm until this method failed. Yard storage handicapped access and concealed hydrants.

Grain Elevator — Country

July 21 Litchfield, Minn. Farm Feed Manufacturing Co., et al. 263,000
Combustible construction, lack of sprinklers, dust laden interiors, close spacing and insufficient fire defenses contributed to this large loss. Animal feeds were the principal contents destroyed.

Grain Elevator — Terminal

April 4 Dodge City, Kansas Dodge City Flour Mills 450,000
Spark in elevator leg ignited dust which caused flash fire. Surrounding communities sent fire equipment on call for aid as flames threatened exposed property; fire fighters successful in confining loss to unsprinklered mill and elevator.

May 5 Moro, Oregon Morrow Grain Growers Association 329,000
162,000 bushel elevator. Employees had left building for lunch when fire broke out and spread through open fire door from feed room to elevator; dust explosion spread flames throughout unsprinklered combustible buildings.

*July 18 Heppner, Oregon Morrow County Grain Growers Co-operative Association 483,000
A series of interconnected buildings, including 3 elevators, bins, warehouse, and offices, 2 coal yards, and 8 railroad box cars were swept by a fire which originated in the head house of one elevator. Close grouping of combustible structures, inadequate water supplies and the need to call for help from distant towns for fire equipment contributed to the loss.

*Aug. 17 Missoula, Montana Montana Flour Mills Co. 253,000
A friction ignited elevator belt fell into the elevator boot undetected. When an outsider gave the alarm at 10:30 P.M., flames had such an advanced grip on the 85 ft. high combustible structure of 200,000 bushel capacity that control could not be established until the fire had spread to exposed buildings (feed mill and office).

Sept. 13 Beatrice, Nebraska Aller and Pease, Inc. 275,000
Small community fire departments cannot be expected to halt an advanced fire in combustible grain elevators where detection and alarm transmission are delayed and no automatic private protection is provided. This 60 ft. by 230 ft. terminal elevator, 20 ft. to 80 ft. high, was 100 per cent subject to a single destructive fire.

Grain, Feed and Seed

*Oct. 19 Independence, Kansas City of Independence, et al. 325,000
Bagged alfalfa meal and fertilizer grade ammonium nitrate. Two war surplus, combustible aircraft repair shops destroyed by fire after lightning struck one and flames leaped a 40 ft. clear space to the second. Particularly significant was the fact that 2,766,700 lbs. of fertilizer (similar to the material which exploded at Texas City) burned without explosive decomposition.

Grain, Feed and Seed (Cont'd)

*Dec. 3 Sherman, Texas — Kimbell Milling Co. — $250,000
6,500 tons of cotton seed, 1,500 bushels planting seed, 400 tons cotton seed hulls. Delayed detection, combustible construction, no sprinklers, close spacing of buildings and lack of fire wall subdivision.

Ice

*Nov. 8 near Alamosa, Colo. — Western Railway Ice Company — 390,000
Two combustible ice houses of 40,500 sq. ft. area. Lack of water, close spacing, and sawdust filled structures contributed to fire spread.

Liquor

Sept. 14 Deatsville, Kentucky — T. W. Samuels Distillery — 599,000†
Wood, metal-clad warehouse, 80 ft. by 160 ft., 10,700-barrel capacity. Located in an unincorporated community lacking fire department protection and underground water supplies; no private protection afforded to compensate for the public deficiency. Whiskey barrels exploded during the fire; effective diking of burning flowing liquor prevented spread.

*Oct. 21 Camp Nelson, Kentucky — Kentucky River Distillery — 2,100,000
17,900 barrels of whiskey destroyed. Property outside fire protection zone, no underground water supplies, no automatic sprinklers. Wood, metal-clad warehouse of 14,768 sq. ft. floor area destroyed. Burning whiskey flowed into river, spreading fire.

Mercantile Stocks

April 16 Mobile, Alabama — Sears, Roebuck Co. (tenant) — 370,000 — 1 killed
Alarm delayed because employees forgot fire department phone number. Large area (30,740 sq. ft) undivided 1-story warehouse in residential area served by only six-inch water mains. Lack of adequate water supply and pressures handicapped fire fighting. Believe caused by light bulb in contact with combustible contents.

*April 30 Columbus, Ohio — Underwriters Salvage Company, et al. — 253,000
Salvaged stock storage and sales. No sprinklers; no watchman; detection by outsider at 8:13 P.M.; fire spread to adjoining buildings because fire walls had only 12-inch parapets and openings through wall were not properly bricked-up.

June 4 San Rafael, California — Montgomery Ward Co., et al. — 350,000
Although reported by a central station automatic alarm, this fire spread beyond fire department control because of a quick start in a paint spray booth and spread rapidly through blocked open fire doors and unprotected vertical openings. A new employee started the fire in the spray booth, mistaking it for an incinerator.

Miscellaneous

June 24 Vancouver, Wash. — Maritime Vancouver Shipyard — 300,000
A 60,000 sq. ft largely empty, combustible warehouse (plywood siding) on concrete foundation walls, two stories high, was totally destroyed by fire despite prompt detection by a watchman and prompt alarm transmission. Inferior wartime construction, a high wind, lack of sprinklers and need to protect exposed buildings were factors.

*July 6 Bangor, Maine — Charles Murray Oil Co. — 1,500,000
Fire originated in oil and coal storage sheds and spread to bus garage and two hardware and builders' supply warehouses. Total fire area about 220,000 sq. ft. of combustible construction. High winds, explosions during fire and lack of sufficient fire department equipment and manpower handicapped fire suppression.

*July 17 Chicago, Illinois — Swift & Co. — 250,000
A largely vacant unsprinklered, five-story warehouse, with 134,000 sq. ft. total floor area, was destroyed when detection was delayed and flames spread through unprotected stairwell and elevator shaft openings. An adjacent building was also damaged.

Multiple Occupancy

Mar. 8 Edmonton, Alberta — **Gault's Alberta, Ltd., et al.** — $1,176,000
Thirty various tenant occupants, mostly storage, but some offices. Fire originated on 4th floor of 6-story fire-resistive building. Heavy loss due to congested storage, delayed detection, lack of installed automatic protection, limited fire department equipment and openings between floors around pipes.

Paper

Oct. 1 Miami, Florida — **The Miami Herald** — 725,000
A fire originating in open trash box spread to newsprint storage on the top floor of the 4-story fire-resistive unsprinklered plant. Paper was packed solid (no aisles) and tiered to within 3½ ft. of ceiling. Fire department hose streams could not reach the base of the flames.

Terminal

Mar. 15 Oakland, Calif. — **Oakland Army Base** — 4,153,000
Clothing, food, machinery, drums of oil, solvents and paint. Minor exposure loss to two freighters at dock. Soldier guard admitted starting fire by touching flame from cigarette lighter to burlap wrapping on stock in storage; intent not malicious, but the result devastating, as the building had 151,200 sq. ft. floor area, was not subdivided by fire walls, and lacked automatic sprinkler protection.

June 27 Buffalo, N. Y. — **New York Central Railroad, et al.** — 445,000
One section (140 ft. by 400 ft.) of a 2,200 ft. long unsprinklered terminal warehouse was destroyed by fire which started on a loading dock. Fire walls, with openings protected, plus effective fire department action saved the balance of the structure. Refrigerators in storage were destroyed.

Tobacco

Mar. 16 Danville, Virginia — **Piedmont Tobacco Auction Warehouse** — 385,000
Eight stores and tobacco auction warehouse. Oil stove explosion spread fire initially and lack of fire divisions and automatic protection permitted spread over 50,000 sq. ft. ground floor area. Housekeeping poor.

Aug. 4 Evansville, Ind. — **H. Fendrich, Inc.** — 309,000
1,800 bales of filler tobacco for cigars destroyed. Fire occurred during fumigation of 11,932 sq. ft. building with "carbocryl." Burlap bag suspended by clothes line and soaked with fumigant fell on electric fan, causing motor to arc and flammable fumigant vapors to explode. 88 sprinklers prevented structural damage, but operated for ¾ hour, causing heavy water damage.

Total Storage Losses: $28,842,000
1 killed

MERCANTILE

Department Stores (see also Multiple Occupancies)

Jan. 22 Little Rock, Arkansas — **Gus Blass Co., et al.** — $445,000
Detected after closing by an outsider; fire had big head start before fire department arrived. Lack of automatic protection; blocked open fire doors; unenclosed stairwells and open air conditioning ducts. Smoke damage reduced by use of deodorant.

Mar. 19 Coshocton, Ohio — **M. O'Neil Company** — 698,000†
Discovery at 10:40 P.M. by passer-by. No watchman, no sprinklers, no enclosure around vertical openings, concealed spaces formed by false ceilings and built-out walls increased rate of fire spread through the 3-story, 20,000 sq. ft. floor area.

April 3 Sedalia, Mo. — **Rosenthal Department Store** — 250,000
Sunday afternoon fire discovered by outsider gutted store. Cast iron pillars supporting first and second floors failed. No automatic protection, no watchman service.

Department Stores (Cont'd)

April 24 Elmwood Park, Ill. Alden's Inc., et al. $518,000†
Row of stores, including ladies' dress shop, shoe store and liquor store. Discovered at 7:00 A.M. Sunday morning. No automatic protection; no watchman; lack of parapets on tile fire division walls permitted flames to jump along combustible roof from store to store.

May 20 Hayward, Calif. J. C. Penney Co. 466,000
Delayed detection (discovery at 12:05 A.M. by outsider), no automatic protection, and large quantities of stocks produced large loss. One story building; origin in stairwell to basement near water cooler.

Drug Store (see also Multiple Occupancy)

Nov. 21 Pottstown, Pa. Exchange Building 350,000
Starting with an explosion in an oil-burning heater in the basement, fire communicated to stock and trash nearby. Boiler not in cut-off furnace room. Flames spread up open stairway to merchandise in drug store and shoe store. Offices in upper floor also involved.

Five and Ten Cent Stores

*Mar. 4 Charleston, W. Va. F. W. Woolworth & Co., et al. 400,000
7 killed
Police in cruiser smelled smoke 25 minutes before turning in alarm when smoke was visible at 3:55 A.M. Seven firemen killed in subsequent floor collapse. Fire spread to adjoining building through joist sockets in intervening fire wall. Exposure fire entered 6-inch deep concealed space beneath roof out of range of functioning sprinklers.

*Mar. 17 Rouyn, Que. Stedmans, et al. 482,500
Combustible construction, close grouping, lack of automatic protection, extreme cold and an explosion at start of fire responsible for large loss. Small volunteer fire department overtaxed and outside aid travel time a handicap.

Grocery Stores — Super Markets (see also Multiple Occupancy)

May 25 Daly City, Calif. King's Market 466,500
Confessed arsonist (recently fired employee) set fire in several places. Large open area (23,000 sq. ft. ground floor area), lack of sprinklers, delayed alarm, and heavy stock storage. Burglar alarm on safe, which dropped into basement, first notification of fire.

June 29 San Bruno, Calif. Lucky Food Stores, Inc. 555,000†
A combustible frame building of 21,000 sq. ft. area lacking sprinklers was destroyed by a fire first discovered at 5:00 A.M. Occupants delayed investigating "crackling" noise and then fought the fire before sending in the alarm.

*Dec. 17 Cleveland, Ohio Central Market, et al. 400,000
A 29,250 sq. ft. central market of combustible construction with 256 merchant stalls (including interior and exterior sales outlets). Discovered at 8:59 P.M. by an outsider, the fire spread quickly to engulf the old wood structure and adjacent properties.

Hardware Store (see also Multiple Occupancy)

July 1 New York, N. Y. Kaminstein Brothers 250,000
Highly flammable and combustible stocks common to most hardware stores were involved in this fire first discovered by a passer-by at 4:43 A.M. No automatic protection and open stairways.

Multiple Occupancy (see also Hotels, Habitational)

*Jan. 6 Spokane, Wash. Lubens Dress Shop 260,000†
Dress shop, shoe store, jewelry shop, bakery, candy shop, theatre. Fire originated on mezzanine in rear of store; not detected until visible from street to passer-by at 10:11 P.M.; no automatic protection; spread to exposed buildings through ordinary glass windows.

Multiple Occupancy (Cont'd)

518,000†

*Jan. 10 Blackfoot, Idaho — Boyle Building, et al. — $250,000
Church hall, jewelry store, restaurant, department store and offices. Unattended cook stove ignited wood floor. Fire department responded, extinguished fire and returned to station. Unfortunately fire had spread undetected to adjoining building through joists in party wall and second fire caused heavy loss.

466,000

*Jan. 20 Independence, Mo. — Lambert Moon Printing Co., et al. — 292,000
Two hardware stores and printing plant. Fire alarm delayed as police investigated before relaying telephone call received at 2:45 A.M. Three-story brick wood-joisted building not sprinklered; fire spread through vertical openings, over fire wall, and via ordinary glass windows. Hardware store contents (flammable liquids and ammunition) increased fire intensity.

350,000

Jan. 23 Flint, Michigan — Douglas Shoe Store, et al. — 459,500†
A group of shoe and clothing stores, offices. Fire discovered at 9:10 P.M. after burglar alarm tracer had failed to detect fire forty minutes earlier. Source of fire difficult to locate as entire unsprinklered building involved.

400,000
7 killed

*Feb. 14 Mount Pocono, Pa. — Nauman Building, et al. — 300,000
Barber shop, clothing store, apartments, shoe repair shop, hotel, liquor store, dwelling and barn. Six buildings of combustible construction in congested district lacking fire division walls involved. Fire department deficient in equipment and manpower; travel time a handicap for mutual aid companies.

482,500

Feb. 19 Cleveland, Ohio — The Shaker Moreland Co., et al. — 1,067,000
Bowling alley, grocery, bakery, florist, beauty shop, ladies' wear, dry cleaning shop, toy store, drug store, barber shop, restaurant, etc.—15 occupancies. Fire spread from basement bowling alley through 38,000 sq. ft. one story, modern "taxpayer" row. Combustible fibreboard; non-firestopped concealed space; lack of sprinklers and fire division walls.

466,500

Mar. 25 Palmyra, N. Y. — Fassett Block — 300,000
1 killed
Jewelry store, hardware store, apartments. Flammable solvent being used to clean clock ignited and fire spread so quickly jeweler lost his life, and 3-story, unsprinklered building was destroyed. Vertical openings unprotected.

555,000†

June 11 Joliet, Illinois — J. R. Hobbs Building — 400,000
Typical 3-story brick, wood-joisted mercantile building housing restaurant, paint store, clothing store, barber shop, offices, hotel, and fur shop. Discovered at 12:30 A.M., fire was reported to the fire department in person after delay in investigating smoke.

400,000

Nov. 17 Kentville, N. S. — F. W. Robinson Building — 252,000
Automobile and electrical supply store, a garage and apartments were destroyed. Originated in a battery charging room; three-story structure 100 per cent subject to a single fire because of lack of horizontal and vertical fire limitations.

250,000

Nov. 26 Brockville, Ont. — Smart's Hardware Store, et al. — 300,000
Hardware store, furniture store and apartments. Origin in basement of hardware store. Mutual aid called from surrounding towns, but fire spread throughout building through nonfirestopped walls and large undivided attic. Exterior wall collapsed.

260,000†

Dec. 6 Binghamton, N. Y. — Moon Block — 250,000
Stores and apartments. Fire originating on back porch at third floor level entered the 4-story building and spread vertically through open stairways; wooden porches were means of spread beyond fire walls. By-standers believed alarm had been given and did not call fire department.

Multiple Occupancy (Cont'd)

*Dec. 16 Lowell, Mass. **Quinn and Elliott Buildings** $250,000
Stove and appliance company, bank and linoleum store. An explosion near an oil burner resulted in alarm at 1:43 A.M. Fire spread to adjoining building as wood floor timbers in fire wall ignited. Large store sign blanked second floor windows from fire department hose streams.

Dec. 16 Lexington, Va. **Adair Hutton Department Store, et al.** 350,000
Department store, clothing store, photo studio and offices. Delayed detection at 3:01 A.M. and delayed alarm transmission due to burned telephone wires handicapped fire control. No sprinklers, high winds and inadequate water supplies from street mains additional factors.

Night Club

*Jan. 29 National City, Calif. **Tahiti Club, et al.** 250,000
Night club, spread to adjacent building housing drug store, 5¢ and 10¢ store, candy shop, music store, offices and lodge hall. Fire discovered at 3:14 A.M. by outsider. Concealed space over combustible false ceiling of bamboo spread fire; fire wall to adjoining building ended at second floor windows and fire entered at windows.

Total Mercantile Losses: $10,261,500
8 killed

TRANSPORTATION

Aircraft (excluding accidents where fire was not primarily responsible for the damage which followed, accident, or the deaths which resulted):

Mar. 4 near Colorado Springs, Colo. **U. S. Air Force B-29** $750,000
Ten airmen parachuted from a B-29 which sustained a fire in flight.

May 25 near Biggs Air Force Base, Texas. **U. S. Air Force B-29** 750,000
1 killed
Eight of nine airmen parachuted to safety from a B-29 when an engine fire in flight forced the occupants to abandon the aircraft.

June 26 Harmon Field, Nfld. **U. S. Air Force C-54** 400,000
Forty-two occupants of this transport plane escaped when the aircraft went out of control on landing and burst into flames.

July 12 Santa Susanna Mountains, Calif. **Standard Airlines C-46** 250,000
35 killed
Fire at impact destroyed a C-46 which crashed in the mountains while making an approach to the Burbank Airport. Thirty-five were killed and 14 escaped.

Aug. 11 Portland, Maine **Northeast Airlines Convair** 300,000
Fire at impact caused almost total loss to a Convair 240 during a landing at the Municipal Airport, as propellers reversed prematurely. All 27 persons aboard escaped through a rear passenger service door except the pilot and co-pilot, who escaped through a cockpit window.

Aug. 29 near Wellpinit, Wash. **U. S. Air Force B-29** 750,000
1 killed
An engine fire which raged beyond control when the propeller could not be feathered, forced the crew to abandon the aircraft at 20,000 ft. Thirteen of the fourteen aboard escaped safely with parachutes. The aircraft, with one still aboard, crashed in a wooded area and started brush and forest fires covering more than 200 acres.

Aug. 31 off San Diego, Calif. **U. S. Navy PMB Flying Boat** 500,000
10 killed
The 30-ton *Martin Mariner* crashed and burst into flames in the ocean two miles off the California coast. Ten crew members lost their lives and only one body is known to have been recovered.

Sept. 12 near San Jose, Calif. **U. S. Air Force B-29** 750,000
Twelve airmen parachuted to safety when an engine fire burned through its nacelle mount. The stricken aircraft plunged to ground and touched off a large grass fire.

Aircraft (Cont'd)

Sept.	15	Long Beach, Calif. U. S. Air Force B-45C Fire in a jet engine while over the Long Beach Airport forced the pilot to crash land this new four-engine bomber on the Lakewood Country Club golf course. Fire at impact was severe, but all four occupants were able to escape before the JP-1 (kerosene type) fuel spread flames to the cockpit area.	$500,000
Sept.	15	near Fort Worth, Texas U. S. Air Force B-36 An engine fire on take-off resulted in the aircraft plunging into Lake Worth after becoming airborne. Four men were reported as "missing," one killed, and eight hurt.	1,500,000 1 killed 4 missing
Sept.	26	near Talihina, Okla. U. S. Air Force B-29 Thirteen airmen died when a B-29, on a routine training mission, crashed and burned in a mountain area in southeastern Oklahoma.	750,000 13 killed
Nov.	3	near Hamilton, Bermuda U. S. Air Force B-29 Eleven of 14 airmen aboard a B-29 were killed when the aircraft crashed and burned 1 mile off-shore soon after take-off from Kindley Field.	750,000 11 killed
Nov.	11	near Brownsville, Ind. U. S. Air Force B-29 Parachutes saved 10 lives before an engine fire spread to cause an airborne explosion. The aircraft crashed in flames on a farm.	750,000 2 killed
Nov.	16	near Stockton, Calif. U. S. Air Force B-29's Two B-29's collided in flight and both crashed. Eighteen airmen perished, as one plane caught fire in the air and the other burned at ground impact. Three airmen parachuted safely from the two planes.	1,500,000 18 killed
Nov.	18	near Tampa, Fla. U. S. Air Force B-29 Fire on take-off in one engine resulted in a crash which was fatal to 5 of 9 men aboard the aircraft. The B-29 was scheduled to go on a search mission for another B-29 missing for 75 hours off Bermuda.	750,000 5 killed
Nov.	29	Dallas, Texas American Airlines DC-6 Twenty-eight were killed when a DC-6 attempted to land at Love Field in Dallas on three engines, with some further engine trouble just prior to the accident. The aircraft struck two buildings on the edge of the airport and the resultant fire consumed both structures valued at $50,000. Eighteen occupants, including the pilot, escaped.	900,000 28 killed
Dec.	15	Roswell, N. M. U. S. Air Force B-29 Six crew members were killed and eight escaped when a B-29 crashed and burned, striking a windmill on ground contact. Preliminary reports credit fire fighters with the rescues.	750,000 6 killed
Dec.	22	near Savannah, Ga. U. S. Air Force B-50 All eleven crew members were killed when a B-50 plunged in flames into a water-soaked rice field. Rescue crews had to use special equipment to reach the scene due to the marshy conditions of the ground.	850,000 11 killed

Marine Vessels

Jan.	19	Off New Jersey Coast USSG *Eastwind* and SS *Gulf Stream* Collision in heavy fog of Coast Guard ice breaker and 10,000-ton tanker. Fire aboard ice breaker burned for several hours; cork insulation ignited. Total fire and collision damage approximately $1,250,000.	625,000 11 killed
Feb.	17	Off Lower California Coast M.V. *Reina del Mar* Fire of unknown cause broke out in the engine room of the 1,300-ton, diesel electric, wooden fishing vessel. Fixed carbon dioxide system installed in engine room ineffective. Approach with hand extinguishers and access to fire pumps barred by heat. All 12 crew members safely abandoned ship in lifeboats and were picked up by S.S. *Hoosier State*.	985,000

Marine Vessels (Cont'd)

Aug. 25 Greenland Sea U. S. Submarine *Cochino* $7,000,000
7 killed
Battery trouble resulted in the generation of excessive quantities of hydrogen gas in the battery room of the submarine while running just beneath the surface during a gale. Despite heroic efforts of the crew to correct the trouble repeated explosions of hydrogen so damaged the submarine that she sank after 14 hours. Of the 7 men drowned during rescue operations most were from the crew of the rescue vessel, the U.S. Submarine *Tusk*.

Sept. 17 Toronto, Ontario S.S. *Noronic* 14 missing 3,500,000
104 killed
14 missing
Cruise ship burned at pier with heavy loss of life because of lack of automatic protection and alarm system, vertical fire bulkheads, enclosures around stairwell openings, and any prearranged emergency evacuation and fire defense plan. Large quantities of combustible materials used to subdivide passenger cabins and to form corridors, light wood interior finish, and combustible furnishings and fixtures contributed fuel to fast spreading fire. Delayed alarm to fire department. (See complete story in this issue of the *Quarterly*.)

Nov. 2 Off Alameda, Calif. S.S. *Hawaiian Rancher* 250,000
Welding operations on the bulkhead in hold No. 1 ignited a cargo of combustible fibreboard on the opposite side of the bulkhead in hold No. 2 of the 8,353-ton freighter. The ship made the 2-mile run to Alameda, where shore equipment and a fire boat flooded the smoldering fire.

Total Transportation Loses: $25,810,000
264 killed
18 missing

HABITATIONAL

Dormitories

Feb. 13 Lenox, Mass. Our Lady of Mercy Preparatory School $500,000
Mansion converted to dormitory. Fire discovered at 3:00 A.M. in basement spread through heating ducts, up open stairways and over oak paneling. Burned telephone wires delayed alarm transmission. Poor water supply.

Feb. 27 Gambier, Ohio Kenyon College 260,000
9 killed
College dormitory. Nine students killed in fire discovered by outsider at 4:00 A.M. Defective fireplace chimney; open hallways and stairs; ladder-type fire escapes inaccessible and too hot to descend; inadequate water and hydrants.

Mar. 6 Farmville, Virginia Virginia State Teachers College 350,000
Dormitory, top two floors, auditorium first floor. Occupants investigated smoke odor during evening. Fire discovered on third floor in early morning by outsider. No automatic sprinklers, stairwells not enclosed. Fire Department made a remarkable stop in saving adjoining and communicating buildings.

Dec. 3 Norman, Oklahoma University of Oklahoma 438,500
3 killed
210-room men's dormitory, formerly naval officers' quarters. Combustible 2-story building of approximately 100,000 sq. ft. total floor area with no fire walls or other major barriers to fire spread; no sprinklers; interior partitions plywood and ceilings combustible fibreboard. Fire discovered by outsider at 2:52 A.M. believed to have originated in large trash container in second floor corridor.

Dwellings

*Dec.	25	Hyndman, Pennsylvania	Somers Fisher Dwelling, et al.	$500,000 1 killed

Twenty-five dwellings and apartments and 12 business buildings destroyed in fire involving 3½ blocks. Originated in Christmas tree. Spread to other buildings because of inadequate separation of combustible construction. Bank vault resisted tremendous heat and flame attack.

Hospital

April	4	Effingham, Illinois	St. Anthony Hospital	394,000 74 killed

Hundred bed general hospital. No sprinklers or automatic detection. Originated in laundry chute at basement level of 3-story building. Combustibility of structure, open stairways and corridors, rapid spread of fire on surface of interior finish in corridors combined to prevent possible use of exit facilities.

Hotels (see also Multiple Occupancy, Mercantile)

*Jan.	16	Coaticook, Que.	Hotel Child, et al.	481,000

Hotel, church, stores, apartments and rooming house — 6 buildings destroyed, 2 damaged. Hotel night watchman discovered fire on the first floor when he awoke at 8:02 A.M. Fifteen-minute delay in getting fire department over public pay telephone. Exposures involved because of inferior combustible construction in a congested built-up area.

*Jan.	20	Dickinson, N. D.	Villard Hotel, et al.	350,000

Hotel, restaurant, grocery store, hardware store, furniture store, offices and apartments. Originated in basement café in hotel building at 2:30 A.M. No automatic detection or sprinklers. Spread vertically through nonfirestopped walls, open stairs and elevator shafts. Spread to exposures through ordinary glass windows.

*Jan.	21	Wilmington, N. C.	Orton Hotel, et al,	512,000 2 killed

Hotel, miscellaneous retail stores, theatre and offices. Delayed detection of fire discovered in first floor store in 5-story hotel building at 12:18 A.M. No automatic protection. Two guests killed; fire spread vertically through open stair and elevator shafts. Fire spread to theatre building through air conditioning vent on theatre roof.

Mar.	16	Minneapolis, Minn.	Majestic Hotel, et al.	483,500

Hotel with stores on first floor. Short circuit in amplifier cabinet in piped-in music system in ice cream store. Fire discovered at 11:49 P.M.; spread through concealed spaces above false ceiling and under floor; 2 stairways first to third floors open.

*Dec.	2	Sapulpa, Okla.	Loraine Hotel, et al.	280,000 1 killed

Hotel, market, home appliance store. Originated in kitchen exhaust duct above false ceiling in hotel. Discovered by outsider at 12:50 A.M. One guest killed. No watchman; no automatic protection; open stair and elevator shafts; inadequate separation of buildings of combustible construction and plain glass windows permitted spread to exposure.

Total Habitational Losses: $4,549,000
90 killed

MISCELLANEOUS

Aircraft Hangar

Mar. 3 Lincoln, Nebraska — Lincoln Municipal Airport — $500,000
Hangar and two 2-engine aircraft. Originated during transfer of fuel in aircraft inside hangar; ignition from auxiliary power plant used to transfer fuel. Water fog ineffective on gasoline fire.

Bowling Alley (see also Multiple Occupancy, Mercantile)

Dec. 12 Union City, N. J. — The Playdrome — 346,000
1 killed
Thirty-two bowling alleys, restaurant, bar, table tennis room. Fire originated in concealed roof space. Employees spent 30 minutes looking for and attempting to fight the fire before telephoning the alarm at 2:26 A.M. The chef was trapped and burned to death in the kitchen.

Car Barn

Jan. 23 Regina, Sask. — Regina Municipal Street Railway — 1,153,000
Storage and repair of street cars and buses. 37,386 sq. ft. 1-story building, 14 street cars, 17 trolley buses and 9 gasoline buses destroyed. Originated above suspended ceiling of combustible fibreboard. Smoke noticed by citizens several blocks away an hour before alarm given. Flaming sections of collapsing ceiling spread fire. Fire wall extended up to but not above suspended ceiling.

Churches

Jan. 5 Thompsonville, Conn. — St. Patrick's Roman Catholic Church — 255,000
Originated in wall in vicinity of shrine near front entrance. Delayed detection. Spread through nonfirestopped walls to large attic.

Jan. 13 Philadelphia, Pa. — The First Baptist Church — 266,500
Oil storage tank buried beneath basement floor was overfilled. Oil escaped through measuring opening and ignited at boiler. Use of water spread fire. Flames transmitted to main church via organ blower duct.

April 3 Clifton Forge, Va. — Central Methodist Church — 300,000
Overheated smoke pipe possible cause of basement fire Sunday at 7:30 A.M. that spread vertically through open stairways. Lack of aerial ladders handicapped firemen.

May 15 Quebec, Que. — St. Vincent de Paul Church — 251,000
Discovered in stairway to balcony just after congregation left; possible careless smoking. Danger of collapse of walls and steeple interfered with fire fighting. Steeple fell.

*Dec. 16 Roselle, N. J. — First Presbyterian Church — 250,000
Parish house, church, manse and dwelling. Ignition of coal gas escaping from furnace because of clogged chimney. Occupants delayed several days investigating coal gas odor. Burned telephone wires.

Coal Mine (see also Mining Properties, Manufacturing)

Aug. 15 Springfield, Ill. — Peabody Coal Co. — 250,000
2 killed
Fire in 6000 linear feet of mine entry 240 feet below surface. In collision of coal cars, cars jammed against trolley wire, causing sustained electric arc which ignited wooden cars. Flames spread to timbers and coal. Area sealed off and 21 tons of carbon dioxide introduced.

Country Club

Dec. 10 Florham Park, N. J. — Braidburn Country Club — 250,000
Golf club house. Originated in kitchen; telephone wires burned; no water for fire fighting; four domestic propane tanks exploded.

Dance Halls

Feb. 5 New York, N. Y. — Webster Hall — 300,000
Dance hall and meeting rooms. Originated in vicinity of bar on second floor of 3-story brick, unprotected steel framed building. Delayed detection by outsider at 4:40 A.M.; open stairwells, large undivided attic.

Dance Halls (Cont'd)

Sept. 13 Atlantic City, N. J. Pleasure Palace Ballroom, et al. $561,000
Dance hall on "Old Million Dollar Pier." Delayed detection by police at 4:29 A.M. Three hundred foot section on 1900-ft. long pier destroyed. Suspicion of arson.

Exhibition Halls

July 16 San Bernardino, Calif. National Orange Show 319,000
Exhibit building for citrus fruits. Delayed detection by outsider; 1-story combustible building of 105,000 sq. ft. area without fire divisions. No watchman or automatic protection.

Aug. 13 Des Moines, Iowa Des Moines Coliseum 413,500
Exhibition hall for boxing and wrestling. An outsider discovered fire in the 1-story building with 2 balconies at 11:00 A.M.; no sprinklers or watchman protection for the undivided 38,500 sq. ft. structure.

Forest Fires

Aug. 15-30 Vercheres & Lotbiniere Counties, Que. 2,000,000
Series of forest fires burning 140 sq. miles of forest, farm woodland, pulpwood, lumber, farm buildings, bridges, schools. Extreme drought; careless smoking in some instances.

Sept. 21 Middle Fork, California Forest Fire 403,500
Lightning started fire that burned over 6,380 acres of watershed.

Oct. 31 Ventura County, Calif. Forest Fire 344,000
A match discarded by a motorist started fire that burned 19,080 acres of primary and secondary food and pasture cover, 2 sheds.

Garages

July 2 Fort Benning, Ga. United States Army 312,000
Garage for military tanks. No sprinklers or detection equipment. Delayed detection. Delayed alarm transmission by outsider who dialed wrong number. Inadequate water; hydrants too near building.

Oct. 15 Freeport, Illinois Coach Corporation of Freeport, et al. 250,000
Bus garage and auto sales and service. Originated at motor of steam heater unit suspended from ceiling of the unsprinklered 1-story building. Employees delayed alarm transmission 15 minutes until source of smoke located. Fire beyond control when apparatus arrived. Wall with plain glass windows, which divided the 27,865 sq. ft. building, ineffective as fire barrier.

*Nov. 20 Seymour, Ind. Brown Chevrolet Co., et al. 325,000
Auto sales and service garage with 30 cars, feed store, multiple occupancy warehouse, grain elevator. Originated on second floor of garage near paint room. Delayed detection by outsider at 2:42 A.M. Stairwells and elevator shafts not enclosed, no fire division walls, no sprinklers. Exposures involved because of inferior construction.

Grandstands

May 5 Inglewood, Calif. Hollywood Turf Club 3,000,000
Race track grandstand and club house. First discovery by outsider at 11:11 P.M., although watchman patrolled 1,250 ft. long structure. Originated in 4-story club house section and spread through nonfirestopped floor and wall spaces. No draft curtain beneath combustible roof.

May 15 Fort Worth, Texas La Grave Field 276,500
Unprotected steel frame grandstand (12,415 seating capacity), with wood platforms, seats and roof deck. Large areas without fire stops. Discovered by outsider at 1:14 A.M. Originated in hot dog booth.

Hockey Rink

Mar. 15 Quebec, Que. Quebec Arena 441,500
Hockey rink with restaurant and offices. Delayed detection by watchman at 2:30 A.M. Large passageways influenced fire spread.

Laundries

*June	8	Danville, Ill. Hicks Laundry, et al. Laundry, retail stores, offices, restaurant, apartments. Delayed detection at 5:00 A.M. of fire originating on second floor of laundry. Spread to exposures of combustible construction in congested built-up area.	$339,000
June	22	Roanoke, Va. Magic City Launderers and Cleaners, Inc. Partial sprinkler system not in service because owner would not pay $90 annual charges. Delayed detection by watchman at 1:45 A.M.	288,000

Lumber Yard

*Oct.	29	New York, N. Y. Home Lumber Co., et al. Yard stored lumber, lumber sheds, cabinet manufacturing plant, dwelling. Beyond control when discovered in a lumber shed at 12:52 A.M. by an outsider. No watchman; congested storage; inadequate separation of combutible buildings.	250,000

Motion Picture Theatres (see also Multiple Occupancy, Mercantile)

Jan.	22	Downsville, N. Y. English Block Motion picture theatre, 4 apartments, bank, drug store, telephone exchange, American Legion hall. Delayed detection by outsider at 2:15 A.M. of fire originating and spreading through nonfirestopped walls of theatre. Open stairwells; lack of fire division walls.	250,000
June	14	Bridgeton, N. J. Atlantic Theatres, Inc., et al. 1,400-seat theatre, candy shop, dress shop. Discovered at 3:30 A.M. by telephone operator when fire reached telephone wires. No watchman, automatic detection system or sprinklers.	500,000
Sept.	24	Butte, Mont. Park Theatre Motion picture theatre, store and one apartment. Beyond control when discovered by police at 2:10 A.M. No sprinklers or watchman.	300,000
*Nov.	27	Columbia, Tenn. Princess Theatre, et al. Originated in balcony of theatre. Beyond control when discovered by outsider at 2:52 A.M. Spread to adjacent hotel through plain glass windows.	252,000†

Mortuary

Aug.	5	St. Louis, Mo. Kriegshauser Mortuaries, Inc. Funeral parlor with casket display and embalming. Originated in concealed attic space; spread over paper covered combustible fibre batts between joists. Fire inaccessible until holes chopped through tile roof.	255,000†

Office Buildings (see also Multiple Occupancy, Mercantile)

Nov.	1	Washington, D. C. Post Office Department Post Office Department building. Short circuit in electrical distribution system on top floor of 8-story fire-resistive office building. Overheated cable insulation vaporized and exploded in concealed space above corridors and rooms.	255,000
Dec.	29	Syracuse, N. Y. Foote Building Six-story office building with toy store on first floor. Originated in basement near open elevator shaft, extended up shaft and mushroomed at top floor. Fire department advice after previous fire to install sprinklers in basement not heeded.	250,000

Petroleum Production and Distribution

Jan.	11	Los Angeles, Calif. Union Oil Co. of California Two adjacent aboveground storage tanks. Lightning struck steel gasoline storage tank. Roof of tank corroded through. Cast iron fittings on tank broken by explosion. Up draft from fire rendered applied foam ineffective.	300,000
Mar.	11	Gulf of Mexico Shell Oil Co. 160-ft. drilling barge, derrick and a 204-ft. LSM. Blowout of undersea oil well.	750,000

Petroleum Production and Distribution (Cont'd)

*June 22	Los Angeles County, Calif.	Oil wells	$504,000
	Surface structures for 60 oil wells, 15 storage tanks, a barn and 1,680 acres of secondary watershed. Brush fire spread through oil well appurtenances.		
June 23	Perth Amboy, N. J.	California Refining Co.	500,000
	Four firemen killed. 2,000 barrel capacity above-ground tank exploded and skyrocketed during fire.		4 killed
July 19	Montreal East, Que.	McColl-Frontenac Oil Co.	1,000,000
	Explosion of gasoline refinery pumping station. No further information available.		
Sept. 21	Phillips, Texas	Phillips Petroleum Co.	250,000
	No information available; against company policy to release data.		

Pier

June 26	Staten Island, N. Y.	Baltimore & Ohio Railroad	250,000
	Coal loading pier, 11 coal cars, 1 box car, 1 car float and steam hoist destroyed. Delayed detection by watchman. Originated on 22,356 *sq. ft. 2-story structure of open combustible construction.*		

Pipe Line

Dec. 2	Allentown, Pa.	Allentown-Bethlehem Gas Co.	250,000
	Explosion of gas main in street. Windows broken, water from broken water mains inundated building foundation.		

Schools (see also Dormitories, Habitational)

Mar. 21	West Bridgewater, Mass.	West Bridgewater High School	250,000
	Originated in attic of 3-story building while school in session; all pupils evacuated safely. Delayed detection. Inadequate water supply and low pressure prevented hose streams from reaching fire at roof and attic. Fire spread downward through open stairwells and air conditioning ducts.		
April 16	Fordtown, Tenn.	Miller-Perry School	300,000
	Country elementary public school. Beyond control when discovered by outsider at 1:30 A.M. No fire department.		
*May 11	Holtville, Alabama	Holtville Consolidated School	250,000
	Trade school buildings, including woodworking shop, refrigeration plant, canning plant, grist mill. Discovered in woodworking shop by outsider at 6:30 P.M. No automatic protection; no local fire department; inadequate separation of buildings of inferior combustible construction.		
May 24	Arkadelphia, Ark.	Ouachita College	300,000
	Main college building. Lightning struck cupola at 3:15 A.M. No lightning protection installed on structure.		
Dec. 11	Rock Island, Illinois	Central Junior High School	600,000
	Fire, originating on third floor, discovered by outsider at 7:01 A.M. Sunday. Open stairwells; no fire divisions, sprinklers or watchman. 50-mile wind gusts. Roof fires on nearby dwellings controlled.		
Dec. 17	Oliver Springs, Tenn.	Elementary School	250,000
	Rural school with gymnasium. Delayed detection; no local fire department; Oak Ridge Fire Department saved exposed high school; only water enough for one hose stream.		

Vehicular Tunnel

May 13	near Jersey City, N. J.	Holland Tunnel	1,000,000
	Vehicular tunnel beneath Hudson River between Jersey City and New York City. Ten trucks and 600 feet of tunnel damaged. Originated in large trailer truck loaded with 48,536 lbs. of carbon disulfide in 80 55-gallon drums. Tunnel regulations violated. Sixty-six people injured.		

Total Miscellaneous Losses: $22,460,500
7 killed

Doyle Studio, Medford

Fire, originating at an overheated motor, swept the main buildings of the Hurd Millwork Corporation in Medford, Wisc., on May 1. All 700 automatic sprinklers, recently installed in the plant, operated and were reinforced by fire department connections to the system, but the occupancy hazard was too severe for the ordinary dry pipe equipment installed to protect the dusty woodworking occupancy. Quick opening devices on the sprinkler system were out of service on the day the fire occurred and this undoubtedly slowed the initial sprinkler discharge.

An overheated bearing on a planer was the probable cause of this $255,500 fire at Springfield, Ore., July 27. Shortly after employees went home, fire flashed through the dusty 44,800 sq. ft. open-sided planing mill and spread to 600,000 ft. of lumber stored outside. The building was without sprinkler or watchman protection.

Bay City Times

Fire doors blocked open by conveyors in this Bay City, Mich., woodworking plant allowed fire, originating in the middle section, to spread to one of two adjoining sections. The other adjoining section was saved by closing intervening fire doors. Fire occurred on June 12.

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Plain Speaker

The three-story, 300 ft. by 30 ft. planing mill of the Hazleton Planing Mill Company, having neither vertical nor horizontal fire divisions, nor automatic protection, was destroyed by fire on February 1 in Hazleton, Pa. Discovered by a truck driver at 11:20 P.M., the fire had a good start before fire fighters arrived, and flames communicated to a nearby 3-story warehouse and a number of private homes. The insured and uninsured loss is estimated at $525,000.

This $671,000 fire in the sprinklered woodworking plant of the Wm. H. Champlin Company in Rochester, N. H., originated at a motor in the basement and spread to destroy the entire 52,500 sq. ft. structure and outdoor yard storage of lumber on Sept. 21. Failure of sprinklers to control the blaze is attributed to a deficient single source water supply, an extra-hazard occupancy with ordinary-hazard dry-pipe sprinklers, a possible closed valve controlling sprinklers in the area where the fire originated, possible obstruction of some of the piping, and the lack of any quick opening devices on the dry pipe valves.

Acme

Delayed alarm transmission by employees allowed fire on a loading platform to enter this foundry building in Chicago, April 18. Flames spread rapidly over shellacked wooden patterns and two-thirds of the 30,000 sq. ft. structure was in flames by the time hose streams could be brought into position. The fire started when an oil-fired salamander on the platform was tipped over by a hand truck. (See July 1949 Quarterly, page 79.)

Sprinkler water discharging on a drain board overflowed a poorly designed flammable liquid dip tank which discharged to the ground outside this LeRoy, N. Y. plant on March 29. The initial fire was controlled, but reignition of the discharged liquid spread fire to upper stories (through windows) and to roof cornice. (See July 1949 Quarterly, page 67.)

John M. Sternicks, Jr.

On November 20, fire destroyed the shipping department of this Detroit plant manufacturing metal trim for automobiles. Storage of stock in aisleways forced the watchman to detour and prevented prompt detection. Unprotected steel roof supports in the unsprinklered building collapsed during the fire. About 40,000 sq. ft. of the 155,000 sq. ft. plant was involved and the loss is estimated at $1,255,000.

Johnson-Bacheller

The railway refrigerator car repair shop of the Western Fruit Express Company burned to a total loss in St. Paul on March 31. Fire in the 52,000 sq. ft. combustible building gained quick advantage over fire department efforts to control it after a delayed alarm. There was no real fire division wall in the structure and no automatic sprinkler protection.

John M. Sternacki, Jr.

On November 20, fire destroyed the shipping department of this Detroit plant manufacturing metal trim for automobiles. Storage of stock in aisleways forced the watchman to detour and prevented prompt detection. Unprotected steel roof supports in the unsprinklered building collapsed during the fire. About 40,000 sq. ft. of the 155,000 sq. ft. plant was involved and the loss is estimated at $1,255,000.

The sprinkler system in this Barberton, Ohio, sewer pipe manufacturing plant had been allowed to deteriorate seriously and was without an adequate water supply. Although a watchman patrolled the building, detection was by an outsider at 12:59 A.M. on June 29.

Cameo Portrait Studio

A passerby saw a small fire in this property in Cashmere, Wash., at 4:00 A.M. on Sept. 17. He could not promptly turn in an alarm, as there was no fire alarm system and no telephones were accessible at that hour. It was 30 minutes before the town siren called volunteer fire fighters to the scene. The entire 72,000 sq. ft. Cashmere Fruit Growers Union packing plant was destroyed as flames went around and over one fire division wall and spread through unprotected openings in the other. Loss: $595,000.

Union-Sun and Journal

The fallacy of erecting an adjoining and communicating combustible addition to a fire-resistive building was emphasized by this fire on March 5 in a frozen food processing plant at Milton, Ore. Fire originated in the large area 1-story wooden building at left and spread through unprotected openings into the first floor of the 3-story fire-resistive building at right.

Denver Post

Employees who attacked a small grain fire with the wrong type fire extinguishers spread the flames on the second floor of this five-story flour mill in Denver, Colo., on Sept. 22. Automatic detection equipment brought the fire department to the scene, but flames spread throughout the building.

Cameo Portrait Studio

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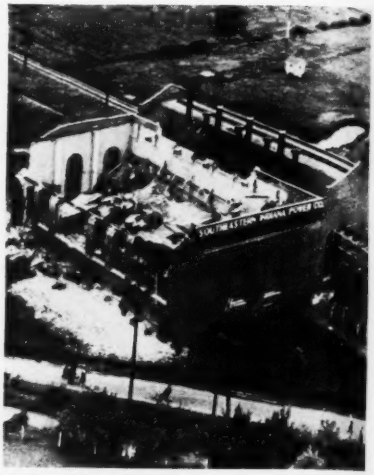
Acme

Hexane vapors escaping from an ineffective seal on this outdoor soybean oil extraction unit were ignited by a welding torch being used within 30 ft. of the unit. The fire occurred at Columbus, Ohio, August 23.



International

The diesel-electric generating station at Rushville, Ind., was severely damaged by an explosion of vaporized oil in an engine crank case on Sept. 15. Vaporized oil was ignited by an overheated bearing.

Union-Sun and Journal

This aluminum foundry and machine shop at Lockport, N. Y., was destroyed by fire on May 24. Ignition of cutting oil (flash point 260°F) at an automatic screw machine by friction or a mechanical spark was the cause. The unsprinklered structure, comprising a single fire area 166 ft. long, 110 ft. wide and 68 ft. high, was quickly involved. Flames entered the auditorium of a school 12 ft. away through a plain glass window before apparatus arrived.

San Francisco Examiner

Substandard protection for fire wall openings, lack of sprinklers, improper storage and inadequate means of access for fire fighting were important factors in the destruction of three of the five sections in this San Francisco grocery warehouse, August 30. Automatic detection equipment provided for prompt fire department response, but fire fighters could not continue their initial attack on the fire from interior positions because of heavy smoke, and locked doors plus blank walls prevented control from the street side. Loss: $2,750,000. (See October 1949 Quarterly, page 109.)

Windowless building walls are a severe handicap to effective fire fighting, as witness this cold storage plant fire in Medford, Ore., June 22. This fire originated in the basement, followed a combustible air-conditioning duct to the upper floors, and then burned down through the structure. Firemen were unable to get water on the flames until the roof burned off.

Detroit Free Press

This food products warehouse in Detroit was destroyed on June 3. Fire is believed to have originated outside in a pile of rubbish and spread to the wooden underpinning of the building. It was the practice to burn rubbish in the yard. The loss is set at $570,500.

Heppner Photo Studio

Lack of automatic means of detection and extinguishment allowed fire, originating in the head house atop the elevator at left, to spread beyond control at Heppner, Ore., July 18. Flames spread rapidly through adjoining and communicating storage sections. (See October 1949 Quarterly, page 107.)

Detroit Free Press

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Oregon Fire Marshal

During the lunch hour on May 5 fire broke out in the 1-story feed room at left of this circular elevator at Moro, Que. Employees had locked exterior doors but did not close the fire door separating the feed room and elevator. A dust explosion spread the fire.

William Kensit

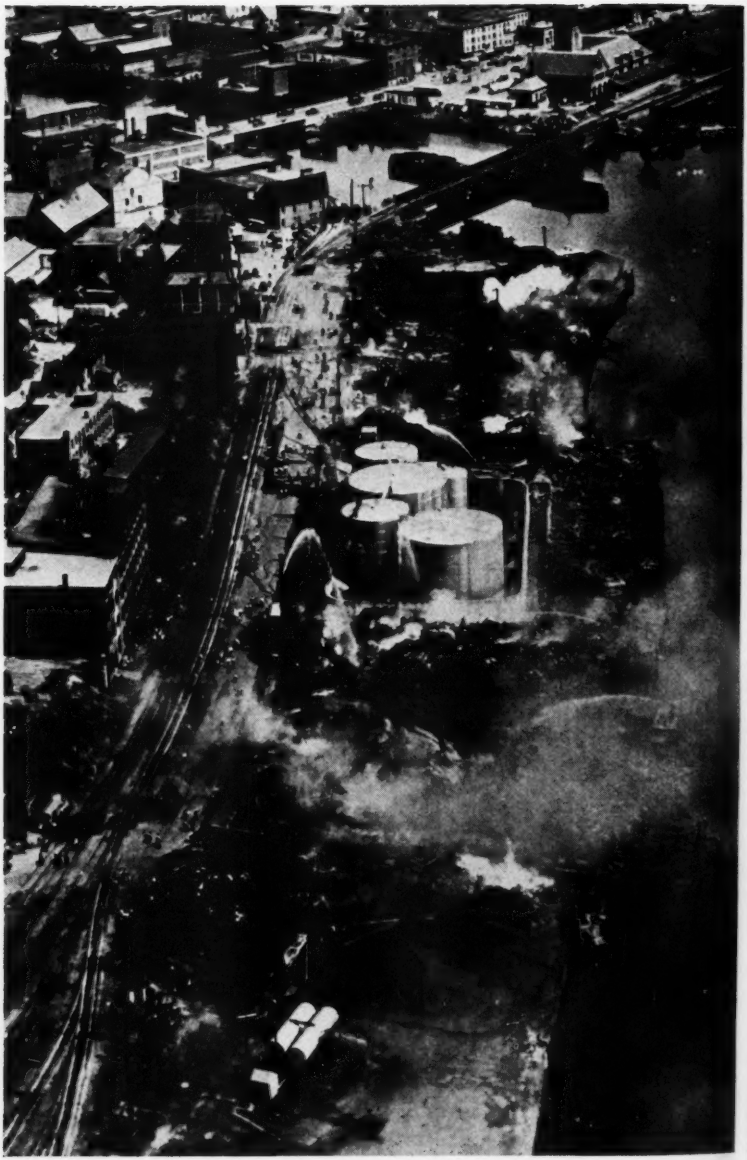
A fire which burned for more than 24 hours severely damaged this 6-story fire-resistive building in Edmonton, Alberta, March 8. The building housed some 30 business occupancies. The fire originated on the fourth floor in the storage room of a wholesale dry goods company. Due to the absence of automatic protection or watchman service, it was not discovered until noticed from the street by a police officer. Fire fighters could not reach the base of the fire because of heavy smoke, congested combustible storage and limited aerial ladder equipment. Fire spread to other floors was through openings around pipes and by heat radiation. Fire doors on enclosed stairwells worked effectively. The loss is estimated at $1,176,000.

George Wheeler

On June 4, fire destroyed this mercantile stock warehouse in San Rafael, Calif. An employee mistook a spray booth for an incinerator and used it to burn rubbish. A blocked open fire door permitted fire to spread from the paint room to the rest of the structure. The fire department, summoned by an automatic fire alarm system, arrived promptly, but the fire was already too far advanced for effective control.

Pitcher

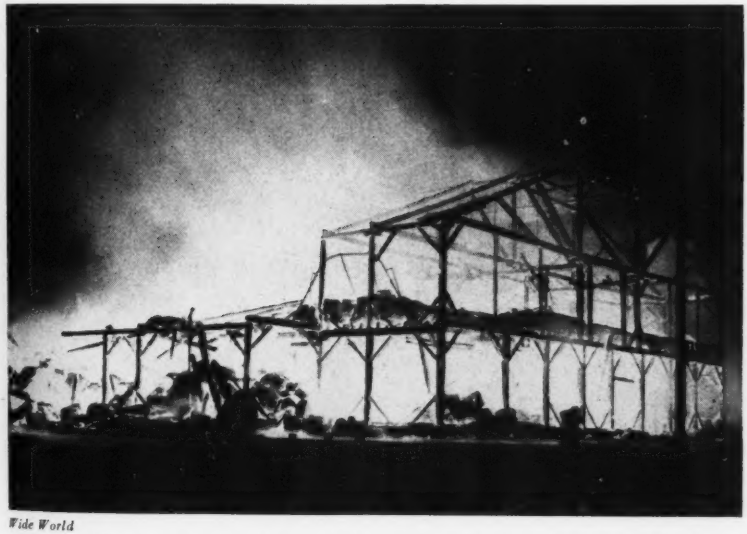
Ruins of the 16,500 sq. ft. center section of a vacuum cleaner parts warehouse in New York City. Large quantities of combustible stock, unprotected steel structural members and lack of fire divisions and sprinklers were factors in the destruction of the building on March 10. (See July 1949 Quarterly, page 64.)



Acme

Wind-driven flames swept an area, 1100 ft. by 200 ft., of congested combustible construction in Bangor, Maine, on July 6. Open areas, a street and river prevented further spread. A 20,000 sq. ft. oil storage area located in the center of the fire and surrounded by a 14-ft. concrete wall was the only part of the fire area to escape damage.

A fire packed bale was the probable cause of fire that destroyed 3,182 bales of cotton at Seymour, Texas, October 21. The watchman kept smelling the burning bale, but mistook the odor for that of burning hulls at a nearby gin.



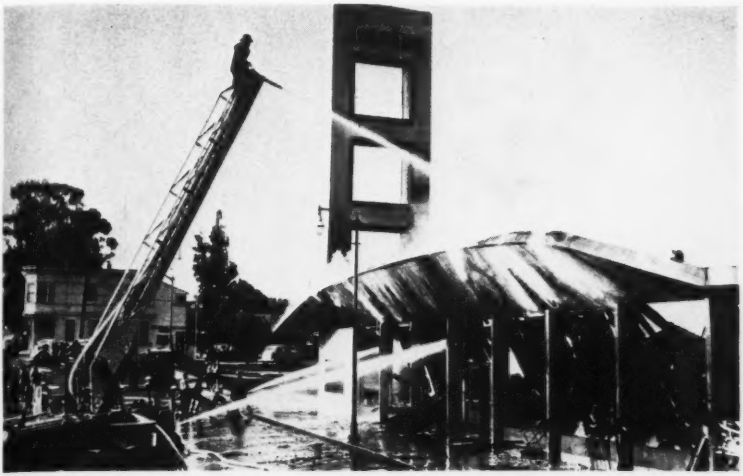
Wide World

Fire broke out on the second floor of this cotton warehouse in Pinedale, Calif., during the night of January 23. The wet pipe sprinkler system had been drained to prevent freezing. No one had informed the watchman that sprinklers were shut off nor instructed him as to the proper steps to take in case of fire. (See NFPA Quarterly, April 1949, page 303.)

An acre of flames in the downtown section of Danville, Va., involved the Piedmont Tobacco Auction Warehouse on March 16. Lacking fire division walls and sprinklers, the large area brick, wood-joisted, dust laden structure was an easy prey to fire.

International News

The Army Base, Oakland, Calif., was the scene of a $4,153,000 fire on March 15. This result should have been expected due to the lack of sprinklers and fire division walls in the 151,200 sq. ft. combustible building loaded with military supplies. (See July 1949 NFPA Quarterly).



Wide World

This fire was discovered at 5:00 A.M., June 29, on the mezzanine floor of the unsprinklered 21,000 sq. ft. supermarket at San Bruno, Calif. Three employees stocking shelves mistook crackling flames for radio static and did not investigate until fire was beyond control.

A. H. Pruett, Jr.

Seven firemen were killed fighting this fire in Charleston, W. Va., on March 4. Fire in the 3-story building of origin (heavy stream entering third floor window) extended to the 3-story building at right through continuous joist sockets in the party wall. The 7-story fire-resistive building at left was in danger because of plain glass windows on the upper floors. (See NFPA Quarterly, April 1949, page 297.)

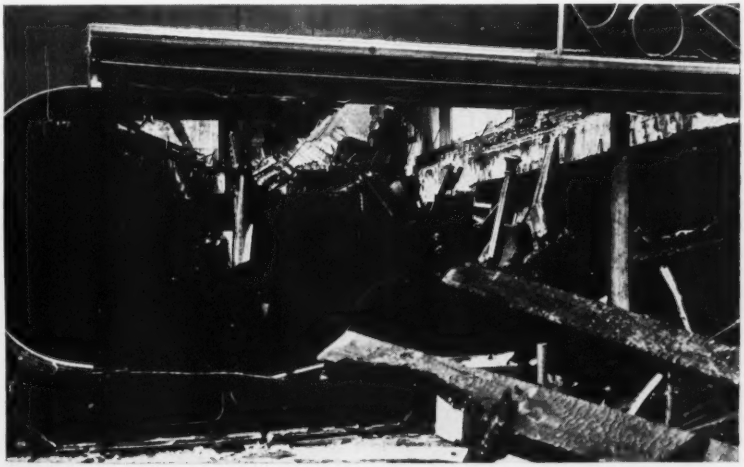
Webb's Studio

Fire originating on the second floor of this department store in Coshocton, Ohio, was discovered by an outsider at 10:40 P.M., March 19. There was no automatic protection. Concealed spaces formed by false ceilings and decorative plywood walls abetted fire spread and greatly complicated fire fighting.

George Eland Studios

100 occupants of this multi-story, unsprinklered mercantile and apartment building were just able to escape through the single stairway available. Originating in the basement of the Smart Hardware Store, the fire destroyed the entire building in Brockville, Ont., on Nov. 26, before control could be established.

A jeweler was killed when fire broke out in his shop in Palmyra, N. Y., March 25. The fire was caused by ignition of solvent (said to be gasoline) being used to clean a clock. Flame spread through nonfirestopped partitions and the open elevator shaft to the blind attic.



Cast iron pillars supporting the first and second floors of this Sedalia, Mo., department store failed during fire on April 3. The 2-story building was unsprinklered and had open stair and elevator shafts connecting all floors. Occurring on a Sunday afternoon when the store was not occupied (no watchman service), the fire was not discovered until a passerby gave a telephone alarm at 3:25 P.M.

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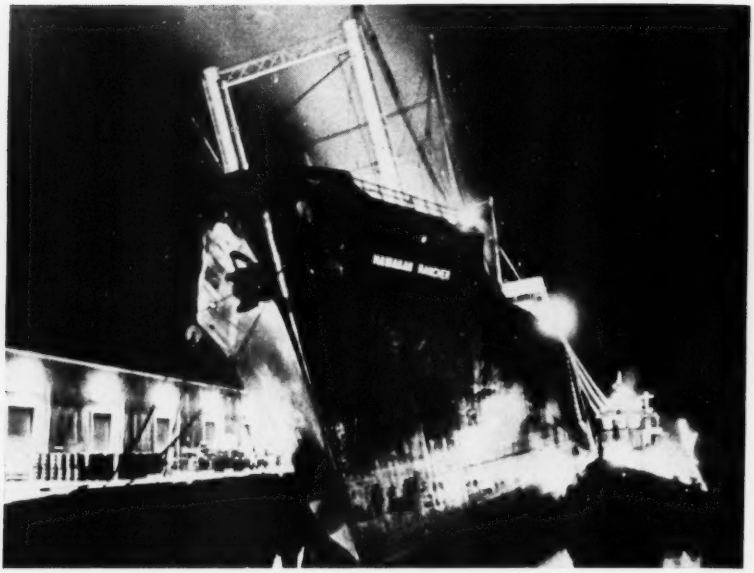


Acme

While two miles from Alameda, Calif., November 2, fire was discovered in the cargo of combustible fibreboard of hold No. 2 of the freighter "Hawaiian Rancher." The ship sped to Alameda, where 78,000 gallons of water was used to flood the smoldering fire.

Wide World

Power failure during a landing approach at Love Field, Dallas, Texas, on Nov. 29 resulted in a crash of an American Airlines DC-6. Fire was instantaneous with impact. 18 escaped, but 28 occupants of the aircraft were killed and two structures were destroyed.

Acme

The reversal of propellers on a Northeast airlines Convair 240 during landing approach resulted in severe ground impact and fire at the Portland (Maine) Municipal Airport on August 11. All 27 persons aboard escaped without injuries, but the lack of airport based fire-fighting equipment allowed flames to gain such headway that the aircraft was considered a "washout." The first piece of city apparatus arrived in seven minutes from a station 2 miles away and fire-fighting operations continued for 4 hours.

Acme

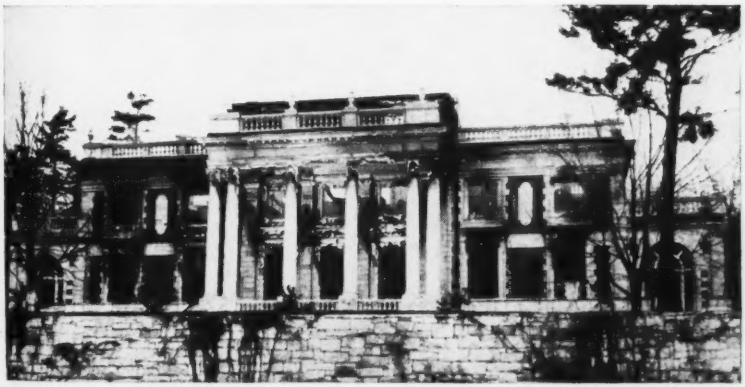
Fire in flight in one powerplant required a forced landing of this B-45C jet Air Force plane just off the Long Beach, Calif., Municipal Airport on Sept. 15. The aircraft was totally destroyed by fire, but the occupants escaped without injury. Fire equipment from Douglas and North American Aviation, a U.S.A.F. Reserve Training Unit, the Long Beach Fire Dept. and the County of Los Angeles Dept. responded to the alarm and extinguished the fire involving kerosene type fuel, in 50 minutes.

Sun-Times

Loss of 74 lives in St. Anthony Hospital, Effingham, Ill., April 4 was the result of a combination of fire protection weaknesses: combustibility of the structure, its combustible interior finish, open corridors, stairways, and other unprotected vertical openings, and the lack of provision for the immediate detection and extinguishment of fire in the incipient stage. (See July 1949 Quarterly, page 18.)

Acme

In the early morning of February 27, a student returning from a late party discovered fire on the first floor of this 122-year-old dormitory at Kenyon College, Gambier, Ohio. Attempts were made to rouse the students, but before the building could be evacuated flames flashed through the hallways and open stairs and made them impassable. Nine men students were killed and 25 required hospital treatment. Many jumped from upper floor windows when they were unable to reach the ladder-type fire escapes on the rear of the building. Several of these who jumped stated that the fire escapes were so hot that it was impossible to descend them. (See NFPA Quarterly, April 1949, page 246.)



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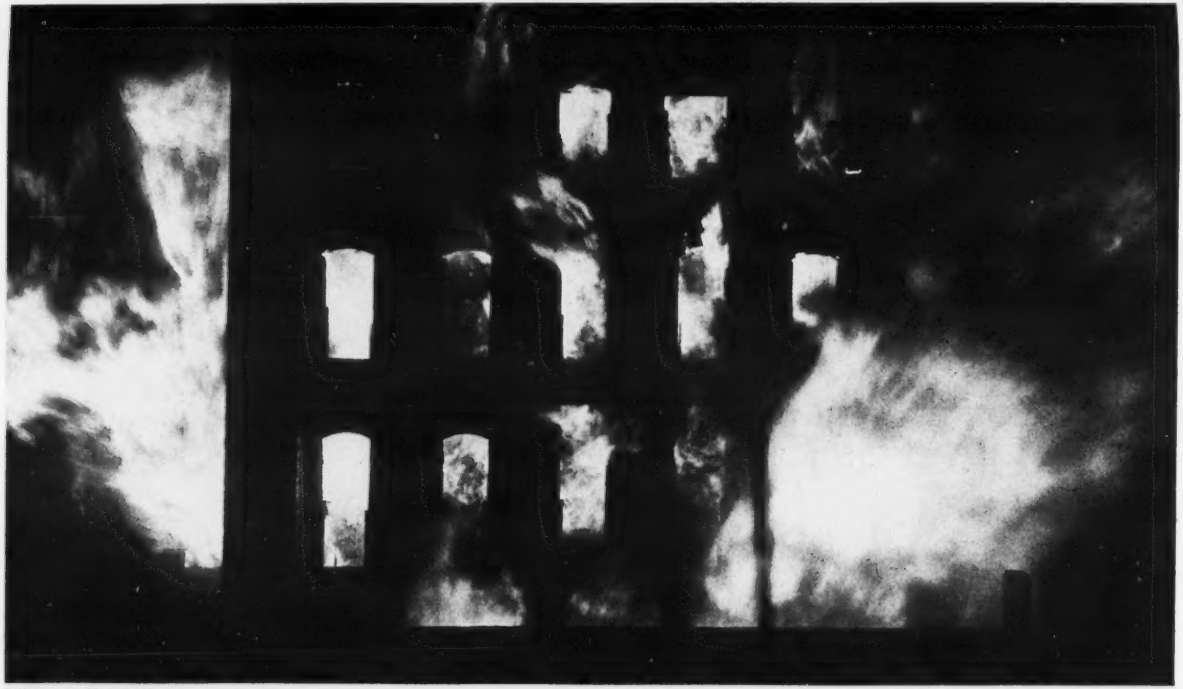
One of the Berkshires' showplaces, a former private estate in Lenox, Mass. (built in 1896 at a cost of over $1,000,000), was destroyed by fire on February 13. It had been opened only the previous September as a preparatory school for Catholic priesthood. Lack of automatic detection equipment delayed fire discovery until a student awoke at 3:00 A.M. Lack of alarm facilities delayed securing help when the telephone wires were found burned. Lack of private fire extinguishing equipment, either automatic or manual, handicapped control and firemen from four communities were forced to rely on long lays to distant hydrants and ponds.

Acme

Seventy students escaped from their dormitory rooms over the first floor auditorium when fire burst from the walls at 6:15 A.M. at the Virginia State Teachers College in Farmville, March 6. Volunteer fire fighters made a remarkable "stop" in preventing the flames from spreading to the two dormitories adjoining the auditorium section. Occupants had smelled smoke the night before and college authorities had the building wiring checked and instituted a ¾-hour watchman patrol as the smell persisted.

Acme

Three students died in the fire discovered at 2:52 A.M. on December 3 on the second floor of the 2-story wooden dormitory of the University of Oklahoma, originally built as a Navy barracks. The building consisted of five 150-ft.-long wings leading off from a 370-ft.-long, 9-ft.-wide, 2-story passageway. Interior finish consisted of plywood partitions and fibreboard ceilings. There were no sprinklers, automatic detection equipment, fire walls or other major barriers to fire spread in the structure.



Wilmington Morning Star

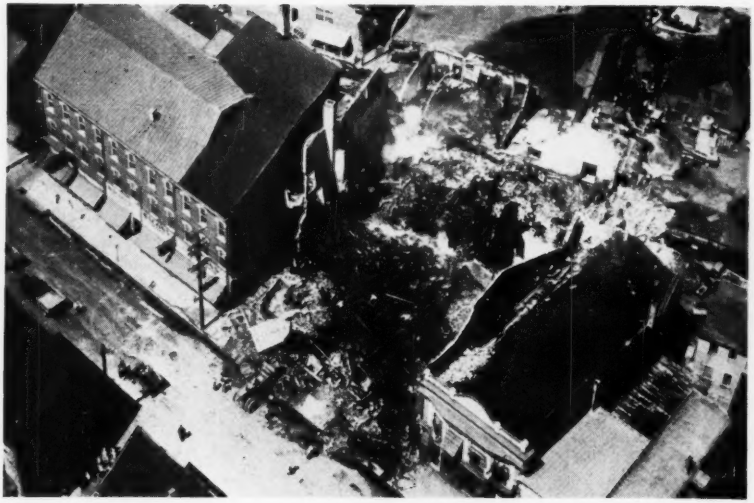
Fire discovered by a hotel bellhop in a shoe store on the ground floor of the Orton Hotel in Wilmington, N. C., at 12:18 A.M. on Jan. 21, spread to destroy the entire structure and damage exposures. Two hotel guests lost their lives. Flame-spread through open stairwells of the old 5-story brick, wood-joisted hotel was so fast that Fire Chief J. L. Croom reported: "In all my time of service with the fire department, I have never before witnessed a fire that traveled over the entire fire area as fast or with such intensity." Automatic sprinklers were being considered by the hotel management to comply with North Carolina statutes, but had not been contracted for.

G. C. Gosselin

Delay in calling the fire department permitted flames to spread through non-firestopped walls to the attic or cockloft of St. Patrick's Church in Thompsonville, Conn., on Jan. 5. Starting near a shrine, possibly from a candle which ignited a wood partition, the alarm was delayed while a worshiper ran first to the church rectory to notify the clergy, who then rushed to the church to investigate without calling the fire department. The alarm was finally given by a nearby merchant at 1:40 P.M.

Stanley A. Bauman

This 84-year-old school at West Bridgewater, Mass., was destroyed on March 21 because fire-fighting water supplies were not sufficient to permit attacking the flames which originated at the cupola. On discovery of the fire at 10:10 A.M. by the janitor, 275 pupils marched out safely when the school alarm bells were sounded. Fire equipment from three surrounding towns was sent to aid West Bridgewater, but was forced to stand by helplessly due to the inadequate water pressures on the six- and eight-inch mains at the school. Like many school properties, the insurance carried was way too low ($91,000) to cover adequately the actual loss ($250,000).



Acme

Because of a fire wall with a high parapet, the bank building at the right of the ruins was open for business on the morning following destruction of the theatre in Bridgeton, N. J., June 14. A fire wall was likewise a major factor in saving the mercantile building at left, which was separated from the theatre building also by a 10-foot alley.

Acme

Fifteen stores were damaged in Cleveland, February 19, when fire broke out in the basement bowling alleys. Patrons and employees had difficulty leaving because of a rather narrow front stairway, smoke, heat and doors swinging inward at the first floor arcade. Originating in a rear storage room, fire flashed through the combustible fibreboard finished alleys and surged up the stairs and through the arcade almost immediately after the last person left.

Wide World

Eight buses and 35 passenger cars and trucks were destroyed in fire that razed this 28,000 sq. ft. unsprinklered garage in Freeport, Illinois, October 15. Employees delayed calling the fire department 15 minutes as they traced the odor of smoke to a steam heated unit heater suspended from the ceiling. Fire was beyond control when apparatus arrived. Control was further handicapped by exploding gasoline tanks in the motor vehicles, one of which was a gasoline tank truck.

Nebraska State Journal

Flames destroyed the 32,000 sq. ft. Nebraska Air National Guard Hangar in Lincoln on March 3 after gasoline vapors were ignited by an electrical spark during fuel transfer operations on a B-26 aircraft. Fire fighters could not secure control with hand water-fog hose streams as the combustible structural materials in the building ignited and aircraft fuel tanks ruptured. This war surplus hangar was one of ten such structures to be destroyed by fire, with resultant large losses (totaling over $6,000,000) since 1947. Municipalities which have inherited many of these properties should investigate their fire vulnerability before further losses are sustained.

Wide World

An exploding 2000-barrel asphalt tank at an oil refinery in Perth Amboy, N. J., on June 23. Four firemen were killed fighting this fire. This shows the result, in an explosion, where the top of a vertical tank is stronger than the bottom. If the top is relatively weak, it will let go and vent the pressure, usually without any disastrous consequences. Where the bottom fails, under pressure, there is the rocket effect shown in the picture. Compliance with NFPA standards for oil tanks, as given in the Suggested Ordinance on Flammable Liquids, should prevent disasters of this kind. The company owning this refinery generally follows NFPA standards and has a relatively good fire record, but in this case, the refinery was an old one, only recently taken over from another company. There was no insurance.

St. Louis Globe-Democrat

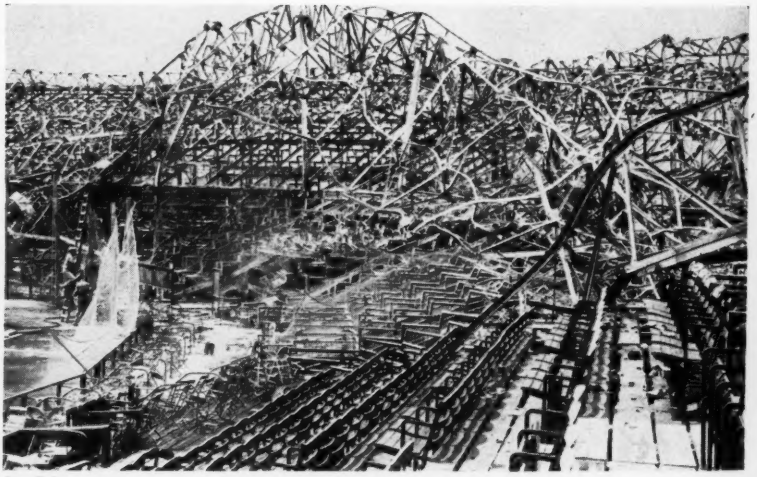
A single hatchway was the only access to the 4-foot-high blind attic in this St. Louis mortuary. On August 5, fire in the attic burned in combustible insulating material out of reach of hose streams until most of the roof had been chopped or burned away. (See NFPA Quarterly, October 1949, page 116.)

Acme

Delayed detection and absence of sprinklers and fire divisions were responsible for the destruction of this 105,000 sq. ft. 1-story combustible exhibition hall at San Bernardino, Calif., July 16.

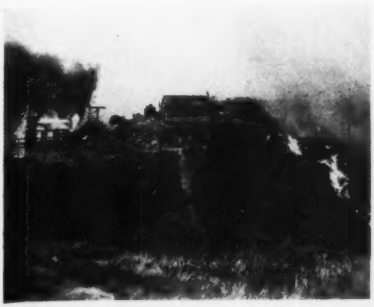
Acme

Fire at the Hollywood Park grandstand, May 5, Inglewood, Calif., originated in the club house section at the extreme left of the picture, where it burned undetected in ceiling and wall spaces before breaking into the open. Seven minutes after discovery it had involved the entire 1,250-foot-long roof deck of the grandstand. (See July 1949 Quarterly, page 73.)



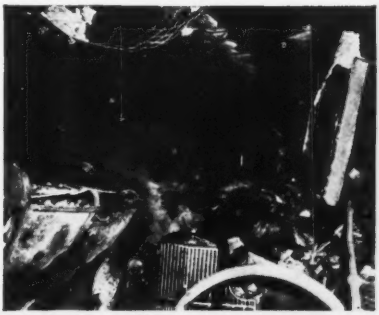
Star-Telegram

Wooden flooring, chairs and roof deck were burning fiercely when fire was discovered at 1:14 A.M., May 15, at La Grave Field, Fort Worth, Texas. Indications are that the fire originated in a concession booth beneath the stands. This fire, and the fire pictured at the top of this page, indicate the vulnerability of unprotected steel framework to fire exposure heats. (See NFPA Quarterly, July 1949, page 75.)



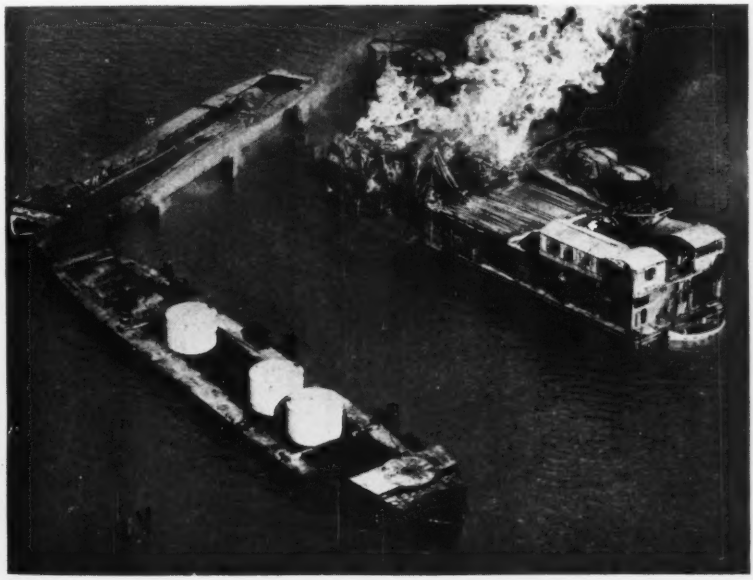
Wide World

A match tossed from the car by a smoker is blamed for this fire that burned over 19,080 acres in Ventura and Los Angeles County, California, October 31-November 2. The fire was discovered by a forest patrolman on special duty due to low humidity and high wind conditions prevailing at the time. The primary water shed loss is estimated at $287,500 and the loss to structures, fences, lumber, cultivated trees and similar private property is set at about $4,500. Total loss $344,000.



Acme

Fire broke out in a trailer truck loaded with 48,536 pounds of carbon disulfide, contained in 80 fifty-five-gallon drums, while the truck was passing through the Holland Tunnel from Jersey City to New York on May 13. Walls and ceiling of the tunnel were heavily damaged for 600 ft., 10 trucks were totally and 13 partially destroyed in the fire. Sixty-six people were injured, 27 requiring hospital treatment. (See July 1949 Quarterly, page 78.)



Ralph Uribe

A 160 ft. drilling barge with derrick and a 204 ft. LSM were destroyed by fire following an oil well blow-out at this under-sea drilling operation off Pass à Loutre (La.) in the Gulf of Mexico. Cratering of the well sucked under the barge and the remaining hulls. Fire continued on the surface but gradually died out.

Table No. 2
FIRE CASUALTY STATISTICS

Deaths	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Transportation	Total
Occupants	27	1	1	90	1	282*	402
Firemen	1	0	7	0	6	0	14
Totals	28	1	8	90	7	282	416
Injuries							
Occupants	133	2	15	10	80	**	240
Firemen	49	61	97	11	84	**	302
Outsider	3	0	0	0	0	**	3
Totals	185	63	112	21	164	**	545

*Including 18 missing and presumed dead.
**No accurate figures available on injuries in transportation accidents.

Table No. 3
FIRE DETECTION METHODS

	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Total	Per Cent
Occupant (employee)	23	13	4	7	19	66	33.8
Outsider (passer-by)	20	18	15	3	18	74	38.1
Watchman (private)	16	7	0	1	3	27	13.8
Police (public or private)	0	3	2	0	2	7	3.6
Explosion	7	1	3	0	3	14	7.2
Automatic detection equipment	1	1	0	0	0	2	1.0
Automatic sprinkler equipment	0	0	0	0	0	0	0.0
Burglar alarm	0	0	2	0	0	2	1.0
Forest fires	0	0	0	0	3	3	1.5
Totals	67	43	26	11	48	195	100.0

Table No. 4
LOCATION OF PROPERTY BY POPULATION CATEGORIES

	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Total	Per Cent
0-500	4	1	0	1	0	6	3.1
501-1,000	1	2	2	0	3	8	4.1
1,001-5,000	11	5	3	4	1	24	12.3
5,001-10,000	7	2	4	2	4	19	9.7
10,001-20,000	5	6	5	2	3	21	10.8
20,001-50,000	7	4	3	1	8	23	11.8
50,001-100,000	3	4	3	0	5	15	7.7
Over 100,000	17	14	6	1	13	51	26.1
Outside but city protected	8	2	0	0	3	13	6.7
Outside and unprotected	3	2	0	0	6	11	5.7
Government Reservation	1	1	0	0	1	3	1.5
Other	0	0	0	0	1	1	0.5
Total	67	43	26	11	48	195	100.0

Table No. 5
CONSTRUCTION

	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Total	Per Cent
Fire resistive	4	3	0	0	1	8	4.1
Non-combustible	7	1	0	0	1	9	4.6
Masonry and wood	30	20	20	9	25	104	53.4
All wood	20	13	0	2	7	42	21.5
Wood frame, metal clad	3	6	6	0	1	16	8.2
Not a building	3	0	0	0	13	16	8.2
Total	67	43	26	11	48	195	100.0

Table No. 6

PRINCIPAL STRUCTURAL DEFICIENCIES INFLUENCING FIRE SPREAD

	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Total
Horizontal Spread						
Inadequate Fire Limitation						
Insufficient fire division on walls	46	30	15	7	19	117
Special hazard area not cut-off	11	2	3	0	1	17
Large undivided attic	2	0	7	3	4	16
Unprotected ordinary doorways	8	3	1	2	0	14
Large undivided basement	0	0	3	5	0	8
Substandard protected openings	2	3	1	1	0	7
Unprotected stock conveyor openings	3	2	0	0	0	5
Fire door not closed or blocked open	1	2	1	0	0	4
Fire Wall Ineffective:						
Poorly constructed	1	1	2	0	1	5
Lack of adequate parapet	1	2	1	0	0	4
Parapet or wing ineffective	0	1	2	0	0	3
Fire spread around fire wall via wood platform, porches or roof cornices	1	1	1	0	0	3
Wood floor joists through fire wall	0	3	0	0	0	3
Exterior Wall Collapse	2	1	1	2	2	8
Nonfirestopped Horizontal Concealed Spaces	1	3	4	2	2	12
Spread Via Horizontal Air-Conditioning Ducts	0	1	2	1	0	4
Vertical Spread						
Vertical Openings:						
Open Stairwells	20	14	17	9	16	76
Open elevator shafts	9	12	7	4	2	34
Spread via stock conveyors	6	2	0	0	0	8
Spread via opening around pipes	2	1	0	0	0	3
Spread via vertical air-conditioning ducts	0	1	0	1	1	3
Structural Collapse						
Roof Collapse	1	0	2	1	0	4
Floor Collapse	0	1	4	0	0	5
Nonfirestopped Vertical Concealed Spaces	0	1	3	1	3	8
Interior Finish and Insulation						
Highly combustible interior finish	1	3	1	2	2	9
Oily floors or walls	5	0	0	1	0	6
Cork insulation on walls	0	2	0	0	0	2
Combustible insulation in wall or floor concealed spaces	0	1	0	0	1	2
Spread to Exposures						
Structural Weaknesses:						
Inferior combustible construction	11	9	3	2	3	28
Ordinary glass windows exposed	7	3	5	3	2	20
Poorly constructed party wall	0	1	3	0	0	4
Interconnecting passageways or conveyors	1	1	0	0	0	2
Inadequate Separation:						
Congested built-up area	5	5	4	2	4	20
Structures unnecessarily close together	9	5	1	1	0	16

Table No. 7

PRINCIPAL PRIVATE PROTECTION DEFICIENCIES AND HANDICAPS

	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Total
Automatic Sprinklers						
No sprinkler protection*	53	39	26	10	34	162
Inadequate water supplies for sprinkler demands and fire department operations	4	1	0	0	0	5
Inadequate maintenance, obstructed piping	2	1	0	0	0	3
Partial protection, origin in non-sprinklered area	2	0	0	0	1	3
Water shut off to prevent freezing	0	2	0	0	0	2
Hazard of occupancy too severe for sprinkler equipment installed	2	0	0	0	0	2
Water shut off for alterations and repairs	1	0	0	0	0	1
Unsupervised valve to water supply closed	1	0	0	0	0	1
Water shut off because owner would not pay fee for city water connection	0	0	0	0	1	1
Antiquated, sub-standard system	1	0	0	0	0	1
Other miscellaneous deficiencies noted	6	2	0	0	0	8
Automatic Detection Equipment						
No automatic detection equipment (excluding detection feature of automatic sprinkler equipments)*	64	41	26	11	34	177
Prompt detection but lack of fire control due to hazards of occupancy or errors in fire extinguishment techniques	1	2	0	0	0	3
Watchman Service (non-operating properties)						
No watchman service*	11	14	18	5	17	65
Non-standard watchman service	7	3	0	2	3	15
Watchman failed to detect fire promptly for unknown reasons	8	3	1	3	3	18
Watchman patrol outside of building only and detection delayed	0	3	0	1	1	5
Watchman fought fire, delayed alarm	3	0	0	0	0	3
Watchman inexperienced, could not operate fire equipments	1	2	0	0	0	3
Watchman asleep while on duty	1	0	0	1	0	2
Other watchman failures	7	4	0	0	1	12
Fire Brigade						
No organized fire brigade when needed	14	6	0	0	1	21
Fire brigade ineffective	6	0	0	0	3	9
First Aid Equipment						
Fire not controlled by extinguishers used	10	6	0	0	3	19
Fire too advanced at discovery	7	3	0	0	2	12
Standpipe and Hose Systems						
Use not effective	7	5	0	0	0	12
Fire too advanced at discovery	4	1	0	0	0	5
Water shut off or insufficient	1	2	0	0	0	3
Special Extinguishing Systems						
Not available to protect special hazard	14	4	0	0	4	22
Not effective although available	3	0	0	0	1	4

*Includes only cases where the protection would have been reasonable and economically practicable.

Table No. 8

PRINCIPAL FEATURES OF BUILDING CONTENTS

	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Total
Flammable Liquids						
Under 20°F. Flash Point	7	2	4	1	9	23
Between 20°F. and 80°F. Flash Point	6	5	1	1	2	15
Between 80°F. and 200°F. Flash Point	4	4	3	0	4	15
Over 200°F. Flash Point	5	3	1	0	1	10
In drums, cans, etc.	7	7	5	1	3	23
In above-ground tanks	3	0	0	0	5	8
In automobile or aircraft tanks	1	0	0	0	4	5
In oil stove, furnace, salamander, etc.	2	1	1	0	0	4
Escape from industrial devices	3	0	0	0	0	3
In dip tank	1	0	0	0	0	1
Compressed Gases Involved						
Liquefied petroleum gases	0	0	0	0	2	2
Acetylene	2	0	0	0	0	2
Ammonia	0	1	0	0	1	2
Others	2	0	0	0	0	2
Natural Gas Line Rupture or Leak	3	0	0	0	3	6
Grains, Flour, Other Powdered Materials	3	7	0	0	1	11
Dusts in suspension (explosion or flash fire)	2	5	0	0	1	8
Ordinary Combustible Materials						
Heavy storage in single fire area	13	19	6	0	2	40
Poor stock subdivision	5	8	0	0	1	14
Oil-soaked materials	4	1	0	0	0	5
Burrowing fire in stock	0	4	0	0	0	4
Water swelling materials	0	2	0	0	0	2
Inadequate window clearance	0	4	1	0	0	5
Inadequate wall clearance	0	4	0	0	0	4
Stock stored to ceiling	0	3	0	0	0	3
Housekeeping Conditions Poor						
Dusty condition	14	5	0	0	1	20
Ordinary combustible materials	7	2	0	0	0	9
Records Not Safeguarded	3	2	1	0	0	6

Table No. 9

PRINCIPAL HUMAN FACTORS

	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Total
Detection of fire delayed in absence of efficient automatic protection	26	30	23	10	28	117
Owner of property obviously neglected fire safety	26	23	7	4	11	71
Delayed transmission of alarm to fire department	17	12	6	0	8	43
Occupants fight fire, delay alarm	11	4	2	0	1	18
Worker safety consciousness obviously lacking	9	4	1	0	1	15
Occupants investigate source of smoke or heat, delay alarm	1	1	0	1	3	6
Bystanders fail to call the fire department promptly	1	3	0	0	1	5
Observers call police instead of fire department	0	0	1	0	2	3

Table No. 10

PRINCIPAL PUBLIC FIRE DEPARTMENT DEFICIENCIES AND HANDICAPS

	Manufacturing	Storage	Mercantile	Habitational	Miscellaneous	Total
Fire Department Deficiencies						
Insufficient equipment	26	16	17	7	13	79
Local F. D. required mutual aid	23	11	15	7	11	67
No fire department locally available	8	3	0	1	4	16
No local F. D., outside F. D. called	8	3	0	1	3	15
Mutual aid not effective	10	1	1	3	0	15
Mutual aid travel time a handicap	2	1	2	2	2	9
Lack of aerial ladders	1	4	2	0	0	7
Inadequate pumper capacity	1	3	2	1	0	7
Equipment breakdown	2	0	2	0	2	6
Lack of special service equipment	0	1	0	1	2	4
Fire Department Manpower						
Insufficient manpower	23	16	15	7	7	68
Poor fire-fighting techniques	1	4	2	0	1	8
F. D. not familiar with property	2	2	0	0	0	4
Fire Department Response to Alarm						
Running distance long	2	1	0	0	2	5
Volunteers slow in organizing	0	2	0	1	0	3
Icy or slippery roads	0	1	0	0	1	2
Fire Department Water Supplies Deficiencies						
Inadequate fire hydrants	15	2	1	3	3	24
Inadequate hydrant volume for hose streams	12	3	1	1	2	19
Inadequate water pressures	4	3	1	2	2	12
No established underground supply	2	3	0	0	3	8
Hydrants too close to building	3	0	0	1	1	5
Fire pump failed during fire or power supply interrupted	2	1	0	1	0	4
Hydrants concealed or inaccessible	2	2	0	0	0	4
Inadequate volume for automatic sprinklers and hose streams	2	0	0	0	0	2
Hydrants defective or frozen	0	1	0	0	1	2
No static water supply source	0	0	0	0	2	2
Weather Conditions						
High or adverse winds	11	4	2	1	6	24
Extreme cold, snow or ice	7	1	4	2	0	14
Extreme drought conditions	0	2	0	0	3	5
Character of Fire Behavior						
Explosion during fire	7	6	4	1	8	26
Heavy smoke conditions	4	8	6	0	4	22
Explosion preceded fire	9	1	3	0	5	18
Toxic fire gases or vapors	1	4	0	0	1	6
Explosion at start of fire	0	2	2	0	1	5
Access Impediments						
Access impeded by congested buildings	3	3	3	0	3	12
Access impeded by blank walls	1	8	1	0	0	10
Access impeded by lack of venting facilities	0	4	3	0	2	9
Access impeded by height of building	1	4	0	0	3	8
Access impeded by severe heat radiation	1	3	0	0	1	5
Access impeded by locked, blocked or jammed doors	1	4	0	0	0	5
Access impeded by railroad tracks	4	1	0	0	0	5
Access impeded by body of water	0	1	0	0	2	3
Other Factors						
Windowless building	0	6	0	0	0	6
Flowing flammable liquids	0	2	0	0	3	5
Leaking gas mains or pipes	2	0	0	0	3	5

The Noronic Pyre

The $3,500,000 S.S. *Noronic* burned at a Toronto pier on September 17, 1949 and 118* of the 695 persons, aboard at time of arrival, lost their lives.

How did so many escape?

Why did 118 die?

The fact is that, as tragic as the *Noronic* fire was, it is a miracle that so many escaped.

The 6,905-ton vessel violated almost every common-sense fire safety principle which history has provided. In addition, the Court of Investigation, conducted under authority of the Canada Shipping Act, found the loss was caused by the wrongful default of the owners and the ship's master in certain detailed specifications.

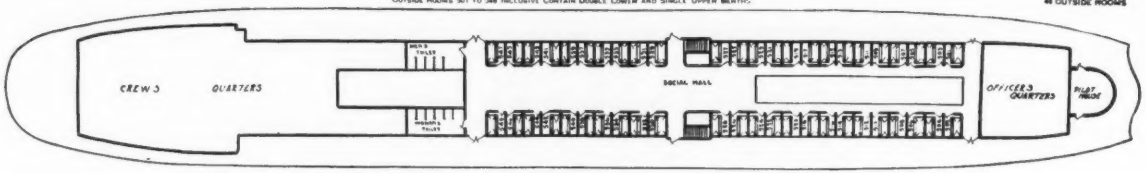
*The official count is 104 dead and 14 missing as of Nov. 21, 1949.

The Telegram

"A" - DECK

OUTSIDE ROOMS 501 TO 548 INCLUSIVE CONTAIN DOUBLE LOWER AND SINGLE UPPER BERTHS.

"A" - DECK
46 OUTSIDE ROOMS

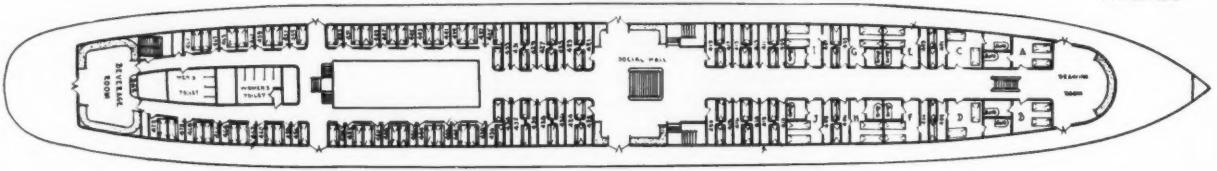


"B" DECK NOT SHOWN - DINING ROOM & OBSERVATION ROOM - NEWS STAND

"C" - DECK

OUTSIDE ROOMS "A" TO "J" INCLUSIVE CONTAIN TWIN BEDS, WARDROBE AND BATHROOM
OUTSIDE ROOMS 401 TO 468 INCLUSIVE, 470 AND 472 CONTAIN DOUBLE LOWER AND SINGLE UPPER BERTHS

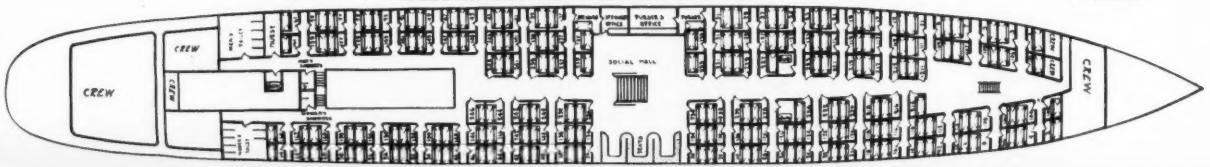
"C" - DECK
16 TWIN BEDS & BATH
70 OUTSIDE ROOMS



"D" - DECK

OUTSIDE ROOMS 1 TO 8 INCLUSIVE, 10 TO 12 INCLUSIVE, 14 TO 27 INCLUSIVE, 29 TO 32 INCLUSIVE, 34, 36, 37, 39 TO 48 INCLUSIVE, 47 TO 62 INCLUSIVE, 64 CONTAIN DOUBLE LOWER AND SINGLE UPPER BERTHS.
OUTSIDE ROOM 9 CONTAINS SINGLE LOWER AND SINGLE UPPER BERTH
INSIDE ROOMS 101 TO 112, 114 TO 150 INCLUSIVE, 152, 154, 156 TO 162 INCLUSIVE, 164, 211, 214 TO 224 INCLUSIVE, 227 TO 268 INCLUSIVE AND 266 CONTAIN DOUBLE LOWER AND SINGLE UPPER BERTHS.

"D" - DECK
57 OUTSIDE ROOMS
39 CENTRE INSIDE ROOMS
31 INSIDE ROOMS



The outstanding violations of commonsense fire safety appear to have been:

(1). The lack of any vertical fire bulkheads in the 362 ft. vessel.

(2). The absence of any noncombustible enclosures around stairwell openings between decks.

(3) The use of combustible partitions to subdivide passenger cabins, to form corridors and even to construct the ship's pilot house. The small congested cabins provided a "forest" of timber within the steel shell and between the steel decks.

(4). The use of light wood for interior finish and decorations in the public rooms, lounges, and similar passenger spaces and for window casings. Large areas of the steel decks were wood planked. According to Captain William Taylor, Master of the *Noronic,* the ceilings throughout the ship were covered with either canvas or masonite.

(5). The extensive use of combustible furniture and fixtures in the public rooms.

(6). The total absence of any automatic fire protection equipment — no automatic sprinklers, no automatic fire detection equipment and no automatic fire alarm devices.

These structural and fire protection deficiencies set the stage for the disaster which struck the ship during the early morning hours of September 17, 1949, as it was docked at Pier 9 of the Canada Steamship Lines, Limited at Toronto, Ontario, Canada. But, these deficiencies were not alone responsible for the tragedy which followed the outbreak of fire in a small linen closet on "C" deck. There were other contributing factors — human factors — the same human factors common to so many fire emergencies, namely:

(1). In the absence of automatic protection or standard watchman service, a delay in fire discovery.

(2). In the absence of conventional alarm facilities, a delay in the transmission of a public fire alarm. A ship to shore radio-telephone in the pilot house was available but not used to call the Toronto Fire Department.

(3). In the absence of a preplanned emergency procedure, valuable time was lost in ineffective efforts to extinguish the fire with hand fire extinguishers and with standpipe hose lines prior to fire alarm transmission.

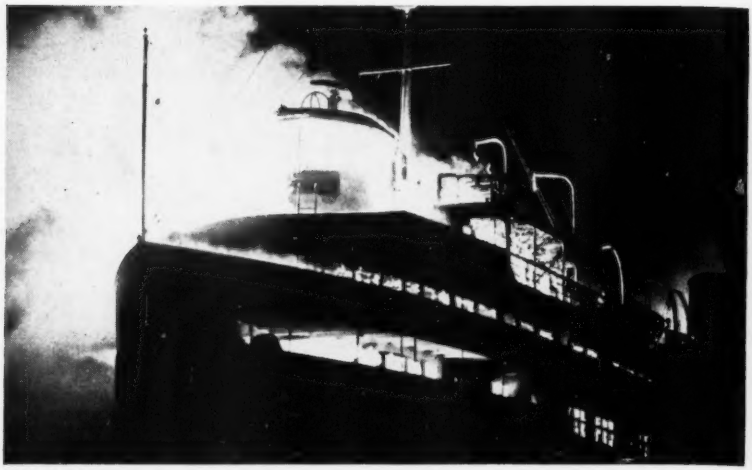
(4). In the absence of an efficient automatic fire alarm system aboard the vessel, an unwarranted delay in sounding an effective shipboard fire signal to awaken sleeping passengers.

(5). In the absence of an efficient exit drill plan and a crew emergency muster, serious delays were incurred by undirected efforts to arouse passengers and to direct their evacuation.

(6). In the absence of all these essentials to life safety, panic ensued in the face of flames, smoke and heat along inadequate escape routes.

When the vessel arrived at Toronto at approximately 6:00 P.M. (E.S.T.) on Friday, September 16, there were 524 passengers and 171 crew members on board. Evidence submitted to the Court of Investigation held in Toronto after the disaster indicates that the passengers were accommodated as follows: 94 on "A" deck; 149

NOTE: The deck plans of the S.S. *Noronic* on the opposite page show "A," "C," and "D" decks which had the passenger accommodations. The fire started on "C" deck in a linen closet on the port side of the vessel opposite rooms 455 and 457. The plan does not accurately indicate this closet. It was located immediately forward of the women's toilet in the enclosure which is not identified on the plan. This enclosure is about 11 ft. by 5 ft. and was divided by a wooden partition which ran lengthwise of the ship to form two linen lockers, port and starboard. The fire had its origin in the port side locker and the door to this locker opened inward opposite the door to room 457. Note that "C" deck shows six stairs. From bow to stern, they are: (1) a narrow stairway in the forward section (just aft of the "C" deck drawing room) terminating at "B" deck; (2) the main stairway amidship in the social hall which commenced at "E" deck and terminated at "C" deck; (3) narrow stairs on the port side amidship (off the social hall) from "C" to "A" deck; (4) a similar stairway on the starboard side amidship (off the social hall) from "C" to "A" decks; (5) an after passenger stairway toward the stern amidship (just forward of the women's toilet and linen room where the fire started), which commenced at "E" deck and went to "A" deck and (6) an after crew stairway (near the beverage room on the port side), which commenced at the engine room on "E" deck and terminated at "A" deck. The only gangway for normal passenger egress to the pier, at the time of the fire, was at the "E" deck level which could be reached only by stairs designated "2" and "5" and both of these were open wells which spread the flames between the decks and were quickly not usable.



Wide World

A comparison of this photograph with the picture on page 213 shows the progress of the flame spread. Note particularly the total involvement of the Pilot House on the top ("A") deck which, by this time, was untenable and the serious progress of the fire to the drawing room and forward staterooms on "C" deck. The people evident in the photograph on page 213 on "C" deck have disappeared in this later picture.

on "C" deck; and 281 on "D" deck. The official report states that "of the 94 persons who had staterooms on 'A' deck, 55 are dead and 9 are missing; of the 149 on 'C' deck, 48 are dead and 5 are missing, while of the 281 on 'D' deck only one perished."

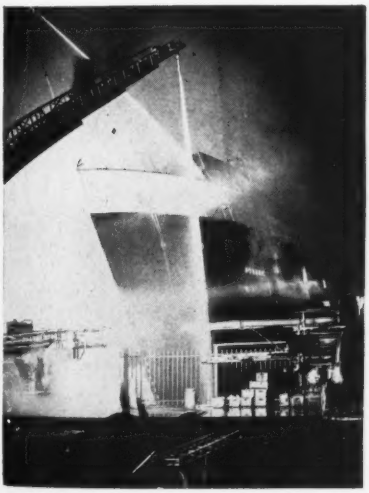
The distribution of these fatalities is obviously in direct proportion to their chances of escape. Since the only egress point to the pier was from "E" deck amidships, those persons on "D" deck had two stairwells available (see plan, page 214 and footnote, page 215) to reach this lower deck and had only one flight to descend. Those on "C" deck had only one direct route to "E" deck — the main stairwell off the social hall amidships — since the fire originated directly opposite the after passenger stairwell and the forward stairs descended only to "D" deck. Those on "A" deck were the most unfortunate, since they would probably have been the last to hear the commotion on the decks below and had only two narrow stairways (port and starboard sides amidships) both of which led directly through "B" and "C" decks which contained serious fire before the ship's klaxon horns and whistle were sounded.

History of the Vessel

The *Noronic* was built in 1913 at Port Arthur, Ontario. The Canada Steamship Lines, Limited, acquired the vessel from the Northern Navigation Company, Limited, a wholly owned subsidiary. The original vessel was apparently modified rather extensively a few years after its construction by the addition of three steel decks and the interior of the top four decks had been redesigned since its purchase by her latest owner. The modified vessel had five decks, including the main or freight deck. She was 362 ft. long, had a 52 ft. beam, a draft of 28 ft., 9 inches, and a gross tonnage of 6,905. The *Noronic* and two similar vessels, the *Hamonic* and the *Huronic*,

Toronto Star

Note that the Pilot House in this view has been completely consumed by the fire and that flames have spread to "D" deck (see forward porthole below the fully involved top three decks which have promenades). Barely discernible in the right foreground are the remains of the broken, wood aerial ladder of the Toronto Fire Department to which reference is made on page 225.



The Telegram

Aerial ladders used as water towers by the Toronto Fire Department. Two 100-ft. aerials were used in this manner after completion of rescue work (see page 225).

had been familiar sights on the Great Lakes for many years.

During the period June 17 to September 2, 1949, the *Noronic* was used on passenger runs between Windsor, Ontario and Detroit, Michigan to Duluth, Minnesota but, at the time of the disaster, the vessel was en route to the Thousand Islands and Prescott, Ontario on a seven-day excursion run originating and terminating at Detroit. The vessel was certificated by the Canadian Department of Transport under date of April 23, 1949, to ply as an "Inland Steamship Class 1"* with 600 passengers and 200 crew. The certificate was to remain in force until April 1950.

*The Canada Shipping Act, 1934 defines an inland voyage, Class 1, as "an inland voyage in the course of which a steamship may go anywhere within the inland waters of Canada, together with such part of any lake or river forming part of any such water as lies within the United States of America."

Toronto Fire Dept.

This aerial photo indicates the position of the five pumpers of the Toronto Fire Department which drafted water. The fire boat is shown at the stern of the "Noronic." Two aerials are at the bow of the vessel from which position they were used first for rescue work and then as water towers. The position of the five pumpers which took water from hydrants along Queen's Quay (upper right background) could not be properly indicated in this picture due to the perspective.

This aerial photo indicates the position of the five pumpers of the Toronto Fire Department which drafted water. The fire boat is shown at the stern of the "Noronic." Two aerials are at the bow of the vessel from which position they were used first for rescue work and then as water towers. The position of the five pumpers which took water from hydrants along Queen's Quay (upper right background) could not be properly indicated in this picture due to the perspective.

It might have been thought that as this vessel was plying in United States waters on the Great Lakes and was carrying passengers to and from United States ports, it would have been subject to the safety standards of United States Coast Guard. However, by international agreement the United States recognized the provisions of Canadian regulations as "approximating those in the United States" and a Certificate of Examination was issued on April 28, 1949 by the USCG. This certificate merely indicated that the vessel complied with Canadian requirements and in effect admitted the *Noronic* to operate to and from the U. S. ports.

Historically speaking, the fate which befell the *Noronic* could, in some respects, have been predicted. On July 17, 1945* a sister ship, the *Hamonic,* was destroyed by fire at Point Edward, Ontario. This fire originated on a pier and spread to the combustible superstructure of the vessel. Miraculously all but one of 360 passengers and crew members escaped without fatal injury as the ship was backed downstream away from the burning pier and beached on a river bank. While the circumstances surrounding the *Hamonic's* destruction differed in significant details, the spread of fire through the two ships was strikingly similar in results.

Sequence of Events

The report of the Court of Investigation conducted by the Hon. Mr. Justice R. L. Kellock on appointment from the Minister of Transport, gives the following estimate as to the origin of the fire on the *Noronic.*

"The evidence establishes that the fire originated in a small room located just forward of the women's wash-room opening onto the port corridor of "C" deck, just aft of the aft stairway leading down to "D" deck. In this port linen locker, towels and bed linen were kept, as well as soap and brushes which the maids used in cleaning. There was also a switch box which controlled the lights in some of the staterooms and, according to the evidence . . . in this room, in common with others of the same type on the ship, there was kept a large cardboard carton, for holding wastepaper and other refuse which the maids collected from the cabins and washrooms. . . .

"The actual cause of the fire was not established, but it should be mentioned that two of the passengers gave evidence that they had on this voyage observed maids smoking cigarettes in the port linen closet. . . . Dr. Joslyn Rodgers† examined what was left of the locker and its partly burned contents, of which there was considerable, but could find no evidence of there having been anything in the locker which might have caused the fire to start spontaneously. Beyond that the evidence does not go. There was no evidence of the fire having been deliberately set. Those who had access to this locker were the maids, the captain, chief steward, second steward, cabin steward, special officers and bellboys.

"The presence of fire in the ship was discovered by a passenger, a Mr. Church, who noticed what he described as a haze in the aft part of the starboard corridor on 'C' deck as he entered that corridor from the lounge at the stern. He traced this haze, which proved to be smoke, to the above mentioned linen locker. When he reached this locker he observed that the smoke was coming from around the sides and top of the door which he tried but found locked. . . . Not being able to enter, he ran forward in the port corridor to the social hall amidships, calling out that the boat was on fire. As he arrived amidships he met the head bellboy, O'Neill, told him the situation, and the two ran back to the locker. Mr. Church and O'Neill do not

*See October 1945 NFPA Quarterly, page 100.

†Dr. Rodgers, Professor of Chemistry at the University of Toronto, was called by the court to give expert testimony since he has been a technical expert for the Ontario Fire Marshal's Office for 25 years.

Toronto Star

Pumpers from across the slip pumped water from the bay and directed it at the port side of the vessel. It can be observed how the stern of the "Noronic" sank to the river bottom. The fire boat is not shown in this picture, but arrived at the scene about 2:46 A.M. and was first positioned at the port bow of the burning vessel, from which position it poured water into the ship from a turret nozzle and two single lines.

Toronto Star

Pier side view shows hose streams being directed into portholes and windows of "D" deck after the fire was under control. Earlier, firemen using hand ladders extended them from this pier to the bay, with a comrade on the bottom of each, and in this way assisted in rescuing scores of passengers who had jumped from the ship into the icy waters. Firemen could not board the vessel until 7:00 A.M., about 4½ hours after the fire was discovered.

The Telegram

Passenger descending a steel aerial ladder positioned 90 ft. from the bow of the burning vessel. Parked cars handicapped getting this equipment into position.

The Telegram

Woman passenger being lowered over the bow by ropes to volunteer rescue workers on a small raft. Firemen who stretched hand ladders to the bay from the pier assisted in the safe removal.

Toronto Fire Dept.

A typical cabin window on "C" deck. The screens (originally over the lower window sections) had to be raised before the windows could be used as emergency exits.

Toronto Fire Dept.

View of "A" deck in way of the life boats. Combustible cabin partitions here burned so fiercely that had the fire occurred at sea life boats probably could not have been used.

entirely agree in detail as to their subsequent movements.... According to Church, it was dark in the locker when the door was first opened. He was down on his hands and knees for fear of an out-rush of flame. He says that he could see something white back in the locker and he could see a flame which would go out but another would light up. He had the impression that the flames were dropping down to the floor from above. O'Neill's observation was that, on opening the door, the wall to his right was in flame and that a white sheet which was hanging down from the ceiling in front of the rear wall was commencing to burn.

"In any event, it was not long before it was apparent to both that fire extinguishers were not going to suffice, as the flames began to come out into the corridor. Church and O'Neill then went aft in the port corridor and pulled down a hose from a hydrant there. Church says that he opened the valve and took the hose forward to the locker, but although he says that he had fully opened the valve, no water came out of the hose. The flames were by this time on the ceiling in the corridor as far as he could see in both directions. In his opinion it was then out of control. . . ."

What transpired after this time indicates clearly the lack of an organized plan to cope with such an emergency aboard the *Noronic* as it stood at the pier in Toronto. The head bellboy had still not reported the fire to any of the other 15 crew members on duty at that hour nor to any officer. It was not, in fact, until after Mr. Church left the scene that O'Neill broke the glass in one of the ship's alarm boxes and then ran to the gangway on "E" deck where he told the crew member on duty there of the fire. There is no evidence, however, that O'Neill's failure to report the fire immediately to his superiors was a breach of instructions or training, for he apparently had not been instructed or trained for such an emergency. Note that still no public fire alarm had been given and no general ship warning for the passenger's benefit had sounded. Operation of the ship's fire alarm box by O'Neill merely sounded an alarm in the officers' quarters on "A" deck and in the engine room on "E" deck.

The lack of crew training and discipline was manifest in many other ways. Captain Taylor did not organize his crew, once he reached the scene, to accomplish an orderly evacuation of the ship. He did make efforts himself to rouse passengers by breaking cabin windows, by brandishing standpipe hoses at various points, and by shouting warnings as he raced along the decks, but in so doing he acted more as a crew member than as the Master of the vessel. There is no evidence that the Captain was intoxicated, as was claimed by some of the passengers, although he admitted having "one drink" earlier in the evening while ashore with one of the passengers.

The First Officer sounded the ship's klaxon horns (operable from the Pilot House) which sounded at various points around the ship. He also pulled the lever to blow the ship's whistle. He said, at the Court of Investigation, that he intended to give the Fire Signal, specified on a card which had been given to each crew member when they signed on the vessel. This signal was "one long, three short, one long,"* but the whistle did not operate properly and continued blowing.

*This is not the recommended fire signal for vessels in port as adopted by the NFPA at its 53rd Annual Meeting. International standardization is being attempted to have five prolonged blasts to indicate fire on board a vessel not under way. See NFPA pamphlet, "Security on Port Facilities and Ships in Harbors" (NFPA No. 311).

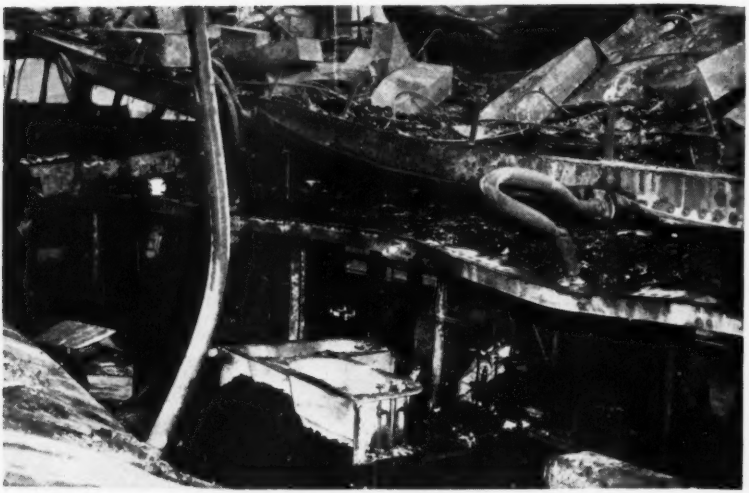
The Second Officer testified that when he heard the alarm he left his quarters forward on "A" deck and went aft and through the doors amidships on the port side. At that time the interior was full of smoke and flame was coming up the starboard stairway from "B" deck. When he reached "C" deck he also made scattered attempts to arouse passengers by knocking and kicking on doors, calling fire and shouting for the passengers to go aft. He also attempted to use a hose which he found lying on the deck but shortly gave up these attempts and tried to pull off the screens on several of the cabin windows from the "C" deck promenade. The cabins by this time were on fire and the roof of the deck was involved. His subsequent action was to go forward on "C" deck, where he found quite a few passengers and he helped get them to the bow of the ship (see photo page 213). After one more attempt to check the starboard side of "C" deck without getting any result he went back to the bow of the ship and over the side on a cable.

Other crew members followed the dictates of their own judgment in attempting to fight the fire and aid passengers, but lacking any specific instructions or directions their efforts were generally ineffective.

Public Fire Alarm

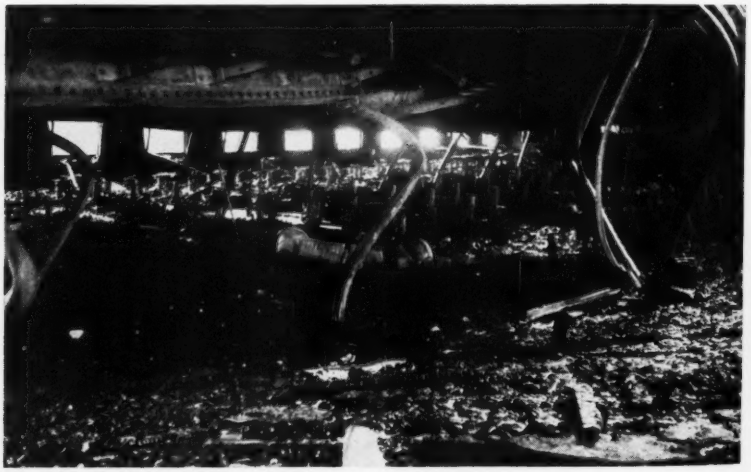
A dock watchman of the Canada Steamship Lines was on Pier 9 near the bow of the *Noronic* when he saw fire breaking through what appeared to be a window towards the stern of the ship on the starboard side between "B" and "C" decks. Up to this time he had heard no alarm from the ship. He immediately ran into the building on the dock, close to where he was standing, and dialed the operator asking for the fire department. He gave the alarm by this method which was received at 1:38 A.M. (EST) by the Toronto Fire Department. While there is no exact evidence of the minute Passenger Church discovered the smoke issuing from the linen closet, it is estimated that it was probably shortly after 1:30 A.M. (EST) by the Commissioner of the Court of Investigation. Land fire equipment response on the first alarm included one pumper company, one hose company, one 100 ft. aerial ladder, a high pressure pumper and a rescue squad. As the first units responded the District Chief in charge saw that the progress of the fire would require additional help and he, accordingly, sent a second alarm by radio at 1:41 A.M. (EST) and a third alarm at 1:46 A.M. (EST). Nine other pumper companies, three more aerial ladders, one hook and ladder and one additional high pressure truck responded to these alarms with Chief Peter Herd, the Deputy Chief and two additional District Chiefs. The Toronto fire boat was ordered to the scene by the fire department alarm operator at 1:39 A.M. (EST) and arrived at the S.S. *Noronic* about 1:46 A.M. (EST) traveling approximately 1½ miles.

District Chief Stevens responded with the first alarm, and found the top three decks of the ship ablaze as he reached the scene, with the only signs of life on "B" deck at the bow and stern where people were silhouetted against the flames and some were jumping from the ship. At this time the wind was from the southwest with an estimated velocity of 12 miles per hour and the *Noronic* was tied to the west side of the pier facing northeast. This unfavorable wind condition had obviously aided the spread of fire through the narrow, open corridors from stern to bow and it became immediately apparent that if those on the bow of the ship were to be rescued, ladders would have to be raised



Acme

"A," "B" and "C" decks are visible in this picture which shows the steel decking and the collapse of the hollow steel deck supports. The view is down the former lightwell, the position of which is clearly shown on the "A" deck plan printed on page 214. "A" and "B" decks at this location were wood planked, with the usual amount of carpet runners in all the corridors and passenger cabins.



Toronto Fire Dept.

The dining room table pedestals were all that remained in the mid-ship section of "B" deck. Note the failure here, also, of the unprotected steel columns and the consequential sagging of the decks. Floor covering in the dining room was linoleum, cemented to the steel, with carpet runners between tables. Ceiling coverings were apparently canvas, but nothing remained to verify this fact.

to "B" deck. An 80-foot wooden aerial was first placed approximately 75 feet from the bow of the *Noronic* and its ladders were extended at an angle of about 25 degrees to "B" deck port side. At the moment the ladder touched the ship a woman clambered on it followed by 5 or 6 men, but due to the motion of the ship and the whip of the ladder with the weight, the tip of the ladder could not be brought down on the bow of the ship. Halfway down the ladder the woman faltered and the men behind her bunched up and the ladder snapped, hurling them all into the water. (These persons were subsequently rescued.) A steel aerial was then quickly placed about ninety feet of the bow of the ship and extended its 100-foot ladder to "C" deck. This ladder was braced by a hand ladder about 15 feet from the base, and firemen were able to ascend and aid numerous passengers to the pier via this route (see photo page 221). During this entire time all the pumpers and the fire boat were pouring water on and into the vessel and firemen using hand ladders extended them from the pier to the bay to assist in rescuing scores of passengers who had jumped into the icy waters from the decks of the burning ship.

The fire was under control about two hours after the arrival of equipment, but firemen could not get aboard the ship until about 6:00 A.M. (EST). 115 firemen and 9 officers attended and the firemen worked all day removing bodies from the vessel. Some 1300 feet of 2½-in. hose and 200 feet of 3-in. hose were used, with a total of 37 hose lines. It is estimated that over 1,700,000 gals. (Imp.) were used with 6 suction lines drafting water from the bay. There were 555 feet of ladders used and 91 salvage covers.

The fire department can be credited with saving the pier, at is was ablaze at the time of their arrival. The Canada Steamship Lines' vessels *Kingston* and *Cayuga* in the adjoining slip were not in any real danger at any time but were removed during the progress of the fire to assure their safety. Firemen were assisted by police, life savers, merchant sailors, navy personnel, taxi drivers and private automobile owners in their efforts to aid the victims of the disaster.

Regulations Applicable

The Canada Shipping Act of 1934 gave authority for the issuance of certain regulations covering, among other things, requirements as to fire resistant bulkheads, fire alarm and fire detection equipment, and fire extinguishing equipment. The Chairman of the Board of Steamship Inspection had authority, however, to exempt an "existing" ship from any of the regulations where "compliance with any such regulation would be impracticable or unreasonable."

A regulation was passed on July 7, 1939 requiring that "ships shall be fitted above the bulkhead deck with fire-resisting bulkheads of such construction, and so fitted, as to serve the purpose of retarding the spread of fire. The mean distance between any two consecutive bulkheads of this description shall not in general exceed 131 feet." While there is nothing in the records found by the Court of Investigation to indicate the reason, the Chairman of the Board of Steamship Inspection did not require the *Noronic* to comply with this provision.

In 1937, a regulation was passed which required that "Class A" vessels (into which Class the *Noronic* fell) be provided with an approved fire alarm or fire detecting system which would "automatically register at one or more points or stations in the ship, where it can be most quickly observed by officers and crew" the presence of fire in any part of the ship "not accessible to a fire patrol system." The *Noronic* was not forced to comply with this regula-

tion either, since the ruling was applied only to Class A vessels engaged on "an international voyage" and the Great Lakes were considered an "inland voyage." There were no regulations, unfortunately, detailing what constituted "a fire patrol system" and the practices followed on the *Noronic* at the time of this disaster were certainly not sufficient or effective.

The Court of Investigation also noted that there was considerable laxity on the part of Government Inspectors in checking the fire extinguishing equipment aboard the *Noronic,* and while this may not have had any direct influence on the disaster, Commissioner Kellock stated that such laxity "could only induce or encourage similar laxity on the part of the owners and officers of the ship with respect to the vital matter of preparedness for fire."

The regulations of the Canada Steamship Lines were extensively reviewed by the Court and the conclusion reached was that while broadly worded instructions had been issued and sent to the Master of the *Noronic* each year from 1945 to and including 1949, Captain Taylor paid little, if any, attention to them and the company knew the instructions issued were not being followed. These instructions (identified as Bulletin No. 13—"Fire and Lifeboat Drill") were also found deficient, in that nothing therein covered a fire emergency while the ship was at dock, being concentrated solely on emergencies at sea.

The *Noronic* certainly did not meet the requirements of the United States Coast Guard as printed in the Federal Register for Tuesday, February 4, 1947, Title 46—Shipping, Part 144 "Construction or Material Alteration of Passenger Vessels of the United States of 100 Gross Tons or Over Propelled by Machinery" or, the "General Rules and Regulations for Vessel Inspection—Great Lakes" dated August 1944. These regulations, largely based on the recommendations of the NFPA Marine Section (first adopted by the Association in 1926), were not applied by American officials since the two governments accepted as equal their regulatory statutes.

It is also clear that the *Noronic* did not approach the international standards set up by the 1948 International Conference on Safety to Life at Sea,* at which Canada was represented. These standards specifically exempt "ships solely navigating the Great Lakes of North America" along with ships of war and "wooden ships of primitive build, pleasure yachts, and fishing vessels." It is not clear why this exception was made as far as the fire safety provisions are concerned. Certainly there is no justification for exposing Great Lakes passengers to greater fire risks simply because they sail on the inland waters of North America.

Conclusion

The principles of life safety from fire on vessels are well established and have been particularly well recognized ever since the *Morro Castle* disaster in 1934.† While the *Noronic* was built in 1913, the continued operation of the vessel in passenger service without fire safety modifications was clearly a principal factor in the disaster of September 17, 1949.

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*See July 1949 NFPA Quarterly, page 47.

†See NFPA Quarterly, October 1934, pages 109 and 113-120.

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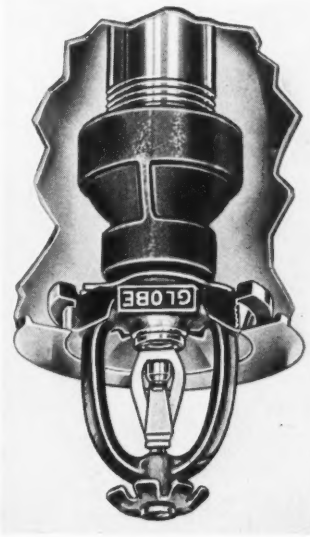

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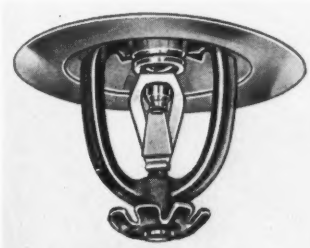

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Toronto Star

Pumpers from across the slip pumped water from the bay and directed it at the port side of the vessel. It can be observed how the stern of the "Noronic" sank to the river bottom. The fire boat is not shown in this picture, but arrived at the scene about 2:46 A.M. and was first positioned at the port bow of the burning vessel, from which position it poured water into the ship from a turret nozzle and two single lines.

Toronto Star

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Toronto Fire Dept.

A typical cabin window on "C" deck. The screens (originally over the lower window sections) had to be raised before the windows could be used as emergency exits.

Toronto Fire Dept.

View of "A" deck in way of the life boats. Combustible cabin partitions here burned so fiercely that had the fire occurred at sea life boats probably could not have been used.

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The Second Officer testified that when he heard the alarm he left his quarters forward on "A" deck and went aft and through the doors amidships on the port side. At that time the interior was full of smoke and flame was coming up the starboard stairway from "B" deck. When he reached "C" deck he also made scattered attempts to arouse passengers by knocking and kicking on doors, calling fire and shouting for the passengers to go aft. He also attempted to use a hose which he found lying on the deck but shortly gave up these attempts and tried to pull off the screens on several of the cabin windows from the "C" deck promenade. The cabins by this time were on fire and the roof of the deck was involved. His subsequent action was to go forward on "C" deck, where he found quite a few passengers and he helped get them to the bow of the ship (see photo page 213). After one more attempt to check the starboard side of "C" deck without getting any result he went back to the bow of the ship and over the side on a cable.

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Public Fire Alarm

A dock watchman of the Canada Steamship Lines was on Pier 9 near the bow of the *Noronic* when he saw fire breaking through what appeared to be a window towards the stern of the ship on the starboard side between "B" and "C" decks. Up to this time he had heard no alarm from the ship. He immediately ran into the building on the dock, close to where he was standing, and dialed the operator asking for the fire department. He gave the alarm by this method which was received at 1:38 A.M. (EST) by the Toronto Fire Department. While there is no exact evidence of the minute Passenger Church discovered the smoke issuing from the linen closet, it is estimated that it was probably shortly after 1:30 A.M. (EST) by the Commissioner of the Court of Investigation. Land fire equipment response on the first alarm included one pumper company, one hose company, one 100 ft. aerial ladder, a high pressure pumper and a rescue squad. As the first units responded the District Chief in charge saw that the progress of the fire would require additional help and he, accordingly, sent a second alarm by radio at 1:41 A.M. (EST) and a third alarm at 1:46 A.M. (EST). Nine other pumper companies, three more aerial ladders, one hook and ladder and one additional high pressure truck responded to these alarms with Chief Peter Herd, the Deputy Chief and two additional District Chiefs. The Toronto fire boat was ordered to the scene by the fire department alarm operator at 1:39 A.M. (EST) and arrived at the S.S. *Noronic* about 1:46 A.M. (EST) traveling approximately 1½ miles.

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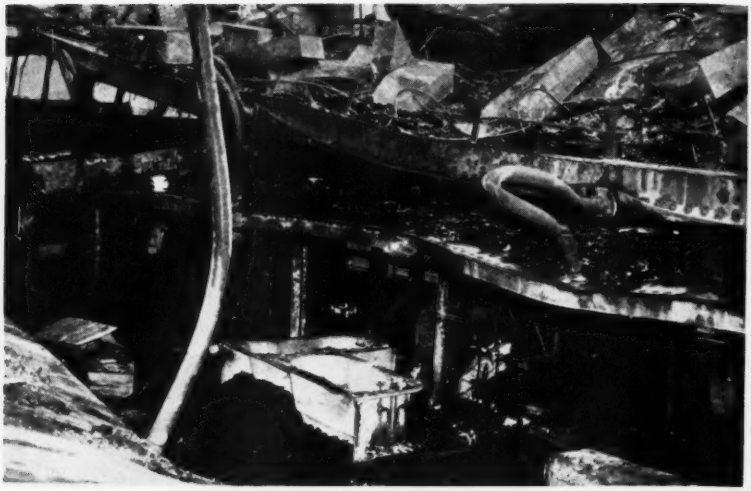

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"A," "B" and "C" decks are visible in this picture which shows the steel decking and the collapse of the hollow steel deck supports. The view is down the former lightwell, the position of which is clearly shown on the "A" deck plan printed on page 214. "A" and "B" decks at this location were wood planked, with the usual amount of carpet runners in all the corridors and passenger cabins.

Toronto Fire Dept.

The dining room table pedestals were all that remained in the mid-ship section of "B" deck. Note the failure here, also, of the unprotected steel columns and the consequential sagging of the decks. Floor covering in the dining room was linoleum, cemented to the steel, with carpet runners between tables. Ceiling coverings were apparently canvas, but nothing remained to verify this fact.

to "B" deck. An 80-foot wooden aerial was first placed approximately 75 feet from the bow of the *Noronic* and its ladders were extended at an angle of about 25 degrees to "B" deck port side. At the moment the ladder touched the ship a woman clambered on it followed by 5 or 6 men, but due to the motion of the ship and the whip of the ladder with the weight, the tip of the ladder could not be brought down on the bow of the ship. Halfway down the ladder the woman faltered and the men behind her bunched up and the ladder snapped, hurling them all into the water. (These persons were subsequently rescued.) A steel aerial was then quickly placed about ninety feet of the bow of the ship and extended its 100-foot ladder to "C" deck. This ladder was braced by a hand ladder about 15 feet from the base, and firemen were able to ascend and aid numerous passengers to the pier via this route (see photo page 221). During this entire time all the pumpers and the fire boat were pouring water on and into the vessel and firemen using hand ladders extended them from the pier to the bay to assist in rescuing scores of passengers who had jumped into the icy waters from the decks of the burning ship.

The fire was under control about two hours after the arrival of equipment, but firemen could not get aboard the ship until about 6:00 A.M. (EST). 115 firemen and 9 officers attended and the firemen worked all day removing bodies from the vessel. Some 1300 feet of 2½-in. hose and 200 feet of 3-in. hose were used, with a total of 37 hose lines. It is estimated that over 1,700,000 gals. (Imp.) were used with 6 suction lines drafting water from the bay. There were 555 feet of ladders used and 91 salvage covers.

The fire department can be credited with saving the pier, at is was ablaze at the time of their arrival. The Canada Steamship Lines' vessels *Kingston* and *Cayuga* in the adjoining slip were not in any real danger at any time but were removed during the progress of the fire to assure their safety. Firemen were assisted by police, life savers, merchant sailors, navy personnel, taxi drivers and private automobile owners in their efforts to aid the victims of the disaster.

Regulations Applicable

The Canada Shipping Act of 1934 gave authority for the issuance of certain regulations covering, among other things, requirements as to fire resistant bulkheads, fire alarm and fire detection equipment, and fire extinguishing equipment. The Chairman of the Board of Steamship Inspection had authority, however, to exempt an "existing" ship from any of the regulations where "compliance with any such regulation would be impracticable or unreasonable."

A regulation was passed on July 7, 1939 requiring that "ships shall be fitted above the bulkhead deck with fire-resisting bulkheads of such construction, and so fitted, as to serve the purpose of retarding the spread of fire. The mean distance between any two consecutive bulkheads of this description shall not in general exceed 131 feet." While there is nothing in the records found by the Court of Investigation to indicate the reason, the Chairman of the Board of Steamship Inspection did not require the *Noronic* to comply with this provision.

In 1937, a regulation was passed which required that "Class A" vessels (into which Class the *Noronic* fell) be provided with an approved fire alarm or fire detecting system which would "automatically register at one or more points or stations in the ship, where it can be most quickly observed by officers and crew" the presence of fire in any part of the ship "not accessible to a fire patrol system." The *Noronic* was not forced to comply with this regula-

tion either, since the ruling was applied only to Class A vessels engaged on "an international voyage" and the Great Lakes were considered an "inland voyage." There were no regulations, unfortunately, detailing what constituted "a fire patrol system" and the practices followed on the *Noronic* at the time of this disaster were certainly not sufficient or effective.

The Court of Investigation also noted that there was considerable laxity on the part of Government Inspectors in checking the fire extinguishing equipment aboard the *Noronic,* and while this may not have had any direct influence on the disaster, Commissioner Kellock stated that such laxity "could only induce or encourage similar laxity on the part of the owners and officers of the ship with respect to the vital matter of preparedness for fire."

The regulations of the Canada Steamship Lines were extensively reviewed by the Court and the conclusion reached was that while broadly worded instructions had been issued and sent to the Master of the *Noronic* each year from 1945 to and including 1949, Captain Taylor paid little, if any, attention to them and the company knew the instructions issued were not being followed. These instructions (identified as Bulletin No. 13—"Fire and Lifeboat Drill") were also found deficient, in that nothing therein covered a fire emergency while the ship was at dock, being concentrated solely on emergencies at sea.

The *Noronic* certainly did not meet the requirements of the United States Coast Guard as printed in the Federal Register for Tuesday, February 4, 1947, Title 46—Shipping, Part 144 "Construction or Material Alteration of Passenger Vessels of the United States of 100 Gross Tons or Over Propelled by Machinery" or, the "General Rules and Regulations for Vessel Inspection—Great Lakes" dated August 1944. These regulations, largely based on the recommendations of the NFPA Marine Section (first adopted by the Association in 1926), were not applied by American officials since the two governments accepted as equal their regulatory statutes.

It is also clear that the *Noronic* did not approach the international standards set up by the 1948 International Conference on Safety to Life at Sea,* at which Canada was represented. These standards specifically exempt "ships solely navigating the Great Lakes of North America" along with ships of war and "wooden ships of primitive build, pleasure yachts, and fishing vessels." It is not clear why this exception was made as far as the fire safety provisions are concerned. Certainly there is no justification for exposing Great Lakes' passengers to greater fire risks simply because they sail on the inland waters of North America.

Conclusion

The principles of life safety from fire on vessels are well established and have been particularly well recognized ever since the *Morro Castle* disaster in 1934.† While the *Noronic* was built in 1913, the continued operation of the vessel in passenger service without fire safety modifications was clearly a principal factor in the disaster of September 17, 1949.

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*See July 1949 NFPA Quarterly, page 47.

†See NFPA Quarterly, October 1934, pages 109 and 113-120.

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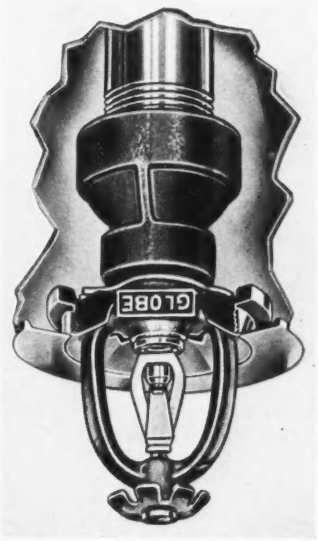

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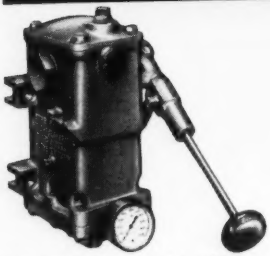
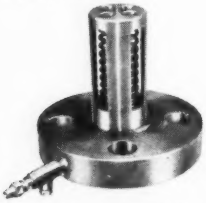
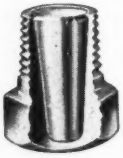


The hydraulic operator which opens the valves.



Hydraulic Internal Safety Valves are installed inside the tank.



The tiny fusible plug shown above is installed at strategic points in the hydraulic line which actuates the Safety Valves.

A carelessly tossed cigarette or match, those two public enemies so often responsible for terrible forest fires, are quite as often responsible for fires and explosions when petroleum truck tanks are being unloaded.

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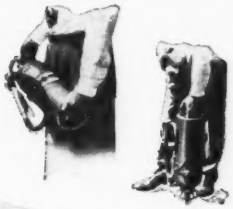

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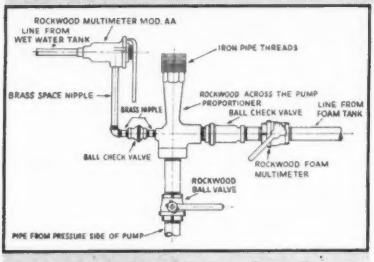

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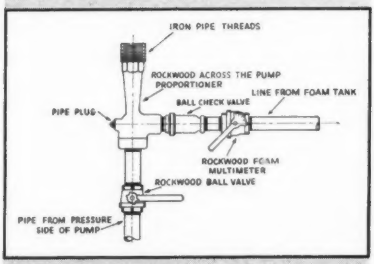
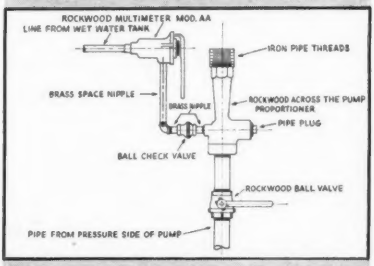


2. Rockwood Around-the-Pump Proportioner Model Dual B for FOAM ONLY.



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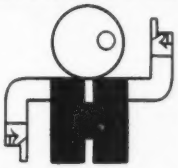

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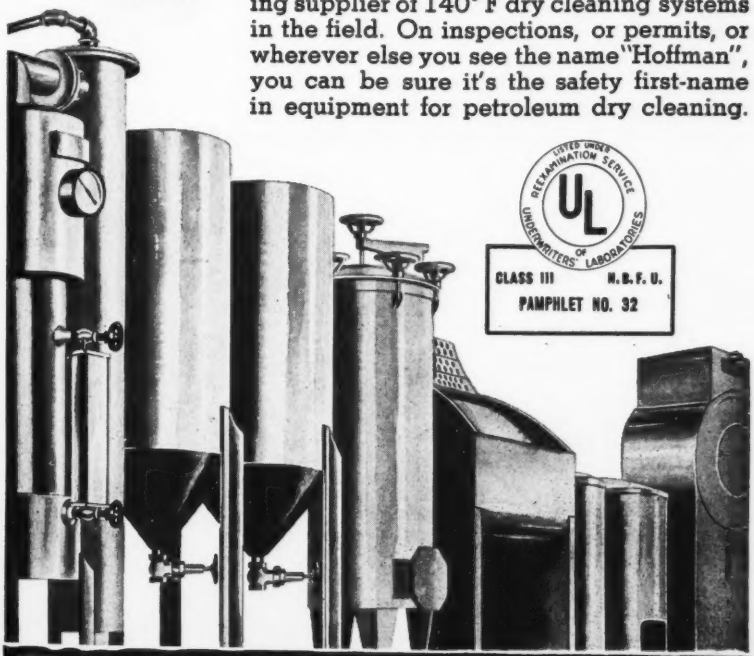

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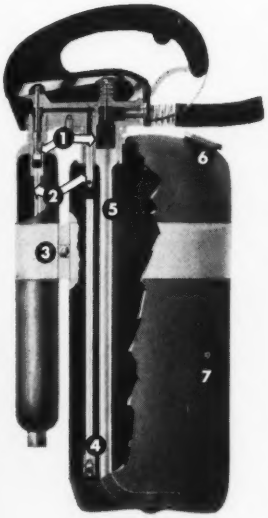

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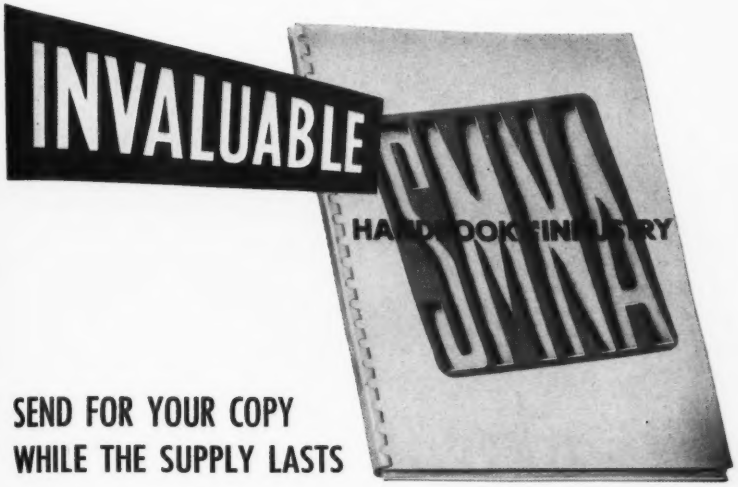

SEND FOR YOUR COPY WHILE THE SUPPLY LASTS

This new Manual is the most authoritative and thorough volume ever compiled on the subject of record-protection equipment. An indispensable reference book, well-organized, easy to use. 76 pages of pertinent information concerning the specifications, tests and specific applications of rated safe-industry products; gives aids for measuring fire hazards and record protection needs and other essential data.

Price $1

A PRODUCT OF *Hooperwood Mills*

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RELIABLE

AUTOMATIC SPRINKLER DEVICES

PROTECTING LIFE AND PROPERTY FOR OVER 25 YEARS

Reliable Automatic Sprinkler Devices have an excellent field record . . . superb in design and construction . . . are universally approved by all Fire Insurance and Governmental Authorities . . . and effect maximum reductions in fire insurance premiums.

They comprise a complete line including Automatic and Open Sprinklers, Alarm Valves, Dry Pipe Valves, Accelerators, Circuit Closers, Water Motors and all other accessories required in Sprinkler Systems.

Reliable Systems are protecting thousands of properties throughout the United States, Canada and foreign countries.

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The Reliable Automatic Sprinkler Co. Inc.

BRONX STREET — MOUNT VERNON, N. Y.

EASIER FIRE FIGHTING FOR YOUR EMPLOYEES!

with

Randolph

Trigger-Touch Carbon Dioxide Fire Extinguishers

Your employees are your *real* fire-fighters . . . and the fire extinguisher is their most powerful weapon. That's why it's important that you eliminate cumbersome, antiquated extinguishers . . . provide them with easy-to-use equipment.

Just ONE HAND snaps the Randolph Extinguisher from its bracket . . . one trigger-touch sends clouds of penetrating, snowy carbon dioxide into the fire . . . stops the most stubborn blaze in *split-seconds!*

With no valves or nozzles to adjust, Randolph Extinguishers are PANIC-PROOF — get the employee to the blaze before it spreads. A non-toxic, odorless gas, carbon dioxide does not damage equipment or conduct electricity. It leaves no stain or liquid; will not freeze or deteriorate.

All Sizes . . . Underwriters Approved

Randolph Trigger-Touch Extinguishers are available in 2, 4, 10, 15 and the big 25 lb. size on wheels . . . every unit approved by Underwriters' Laboratories. Mobilize *your* first-aid fire defense now! For complete fire protection facts or test demonstrations, write . . .

RANDOLPH LABORATORIES, INC.

24 E. Kinzie Street

Chicago 11, Illinois

"Eternal Vigilance"

—THE PRICE OF SECURITY!

WHETHER IT BE NATIONAL OR INDIVIDUAL PERFORMANCE . . . SECURITY IS ACHIEVED ONLY BY THE EVER-ALERT, EVER-CAPABLE AND EVER-DEPENDABLE!

All of these requisites for SECURITY against loss of life and property by fire are provided through the "ETERNAL VIGILANCE" of

STAR AUTOMATIC SPRINKLERS

Automatic Sprinklers
Corrosion-Proof Sprinklers
Directional Flow Sprinklers
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Spray Sprinklers
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Star Automatic Sprinklers and Fire Protection Devices bear approval of all Insurance Authorities having jurisdiction and various Governmental Agencies.

Economy in installation cost and maintenance has dictated the consistent policy of Star Sprinkler Corporation in distributing its Fire Protection Devices through local licensed contractors who have had a lifetime of experience in the installation of automatic sprinkler systems. Operating throughout the United States, Canada and South America, Star licensees, due to their strategic locations, can render instant service. Write us for name and address of Star licensed contractor nearest your location.

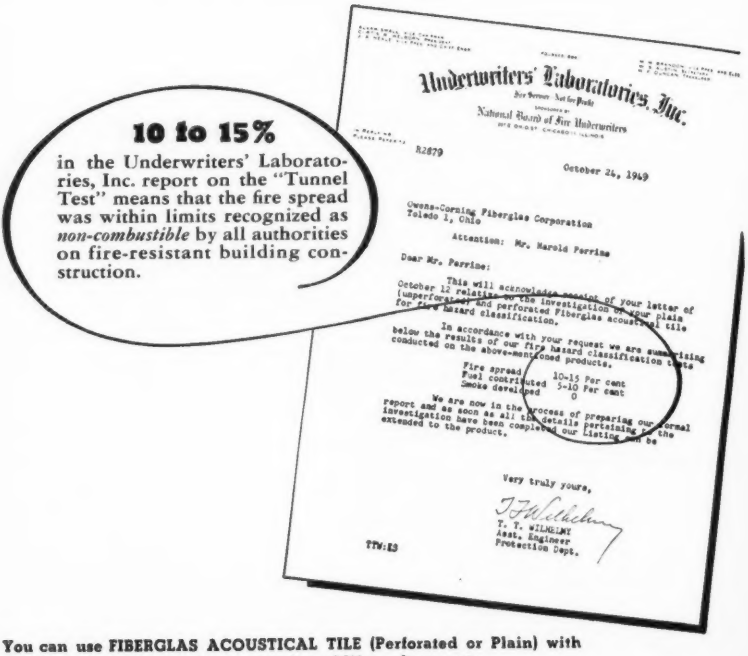
STAR SPRINKLER CORP.

Westmoreland and Collins Sts. — Philadelphia, Pa.

ANOTHER TEST

Proves the Superiority of

FIBERGLAS* ACOUSTICAL TILE



10 to 15%

in the Underwriters' Laboratories, Inc. report on the "Tunnel Test" means that the fire spread was within limits recognized as *non-combustible* by all authorities on fire-resistant building construction.

Underwriters' Laboratories, Inc.
Not for Profit
Organized by
National Board of Fire Underwriters

R2879

October 24, 1949

Owens-Corning Fiberglas Corporation
Toledo 1, Ohio

Attention: Mr. Harold Perrine

Dear Mr. Perrine:

This will acknowledge receipt of your letter of October 12 relative to the investigation of your plain (unperforated) and perforated Fiberglas acoustical tile for fire hazard classification.

In accordance with your request we are submitting below the results of our fire hazard classification tests conducted on the above-mentioned products.

Fire spread	0
Fuel contributed	10-15 Per cent
Smoke developed	5-10 Per cent
	0

We are now in the process of preparing our formal report and as soon as all the details pertaining to the investigation have been completed our listing will be extended to the product.

Very truly yours,

T. T. Wilhelmy
Asst. Engineer
Protection Dept.

TTW:EJ

You can use FIBERGLAS ACOUSTICAL TILE (Perforated or Plain) with added assurance for greater protection of life and property.

OWENS-CORNING FIBERGLAS CORPORATION

Dept. 117-A, Toledo 1, Ohio

*Fiberglas is the trade-mark (Reg. U.S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers.

OWENS-CORNING FIBERGLAS

FOR EVERY *Industrial*

FIRE PROTECTION and WATER STORAGE NEED—

200,000-gal. tank in two 100,000-gal. sections, with 200,000-gal. standpipe at base, for fire protection at large assembly plant.

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ELEVATED STEEL TANKS

Your requirements for standard or special Elevated Steel Tanks can be satisfied in every particular by Pittsburgh-Des Moines! Let our Engineering Department work with you in determining the design best suited to your needs in type, capacity, and performance—for fire protection—for storage of water or other liquids—or for treatment, mixing or settling tanks in any manufacturing process. Write, phone or wire for a prompt consultation.

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DALLAS.....1273 Praetorian Bldg.
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SANTA CLARA, CAL..675 Alviso Road

200,000-gal. Double Ellipsoidal Tank on 125 ft. tower. Columbia Steel Co.

100,000-gal. Hemispherical bottom tank on 116 ft. tower. Crosley Radio Corp.

100,000-gal. Hemi-ellipsoidal bottom tank on 44 ft. tower. El Paso Natural Gas Co.

THIS COULD HAPPEN TO YOU!
BLAST RIPS SIGNAL HILL OIL TANK
Explosion Laid to Fumes Above Tank
A terrific oil tank explosion in the Signal Hill oil field early today caused damage estimated at $50,000 and threatened the lives of firemen who battled the flames which followed
One tank containing 5000 gallons of oil was destroyed, a second was damaged and a nearby derrick was wrecked in the blast
It was believed an accumulation of fumes above the crude oil level was responsible for fire in the first tank.
Risking their lives, a group of firemen entered the second tank, also containing 5000 gallons of oil, and extinguished the flames with foam and water. There were no injuries.
The tank exploded with a roar that could be heard for miles around. Flames shot 150 feet into the air.
Three ignited wood derricks were saved from destruction.
A high voltage line was destroyed.
Two police officers saw the tank explode as they were giving a traffic citation nearby. They turned in an alarm that enabled firemen to reach the scene before the blaze had spread too much.
The Signal Hill fire department was assisted by three companies of the Long Beach fire department.
Flames

Photo by L. A. Beaty News

IT MIGHT not have happened if the tanks were adequately protected with flame arresters and other safety devices. "VAREC" Approved Equipment gives you that protection. "VAREC" Approved Flame Arresters flow large volumes of gas, yet when fire occurs, they immediately stop any flames from passing back into the tank. "VAREC" Approved Internal Safety Valves and Check Valves when exposed to external fire act to quickly stop liquid flow into and from the tank. Investigate these and other "VAREC" Safety Devices for your storage tanks.

"VAREC"
Approved
Flame Arrester Figure No. 50 Series. Listed by Underwriters' Laboratories, approved by Associated Factory Mutuals' Laboratories and other Safety authorities.

"Varec" THE VAPOR RECOVERY SYSTEMS COMPANY
COMPTON, CALIFORNIA, U.S.A.

NEW YORK	CLEVELAND	CHICAGO	TULSA	HOUSTON
30 Church Street	1501 Euclid Ave	122 So Michigan Ave	533 Mayo Building	821 A M & M Bldg

Cable: VAREC COMPTON (all codes)

★ 1920 ★ 1950 ★

30 YEARS OF SUPERIOR SERVICE

Prove

CENTRAL AUTOMATIC SPRINKLER SYSTEMS

Your BEST PROTECTION against the fury of FIRE

Whether it be a wet pipe system or a dry pipe system — or perhaps a Central "Electro-Speed" Deluge Sprinkler System, you will find the one BEST TYPE is a CENTRAL SPRINKLER SYSTEM.

They pay for themselves in insurance savings.

Write us for information.

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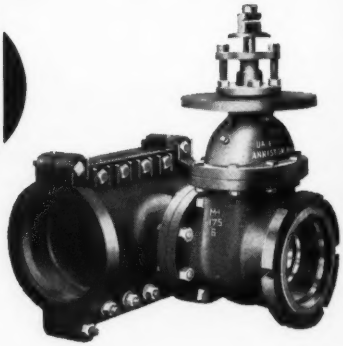
Main Office and Plant
Fourth Street and Cannon Avenue
LANSDALE, PA.

(Representatives in principal cities in United States, Canada and foreign countries)

"Central Sprinklers answer the burning question"

★ 1920 ★ 1950 ★



VALVES, HYDRANTS
Indicator Posts and
Pipe Fittings For
FIRE PROTECTION

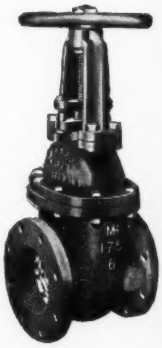
We make a complete line of Valves, Hydrants, Indicator Posts and underground pipe fittings for fire protection systems. All M&H products are approved and listed by the Underwriters' Laboratories and A.F.M. Laboratories. Outstanding features are simplicity of design, rugged construction and highest quality materials and workmanship. Write for CATALOG No. 40. On your orders specify M&H for service.

Top, Left: Swing Check valve.

Above: Tapping Sleeve and valve to tap a main under pressure.

Right: Rising Stem Gate Valve, bronze mounted.

Below, Right: Mill Yard Hydrant, Independent Hose Gate Valves.



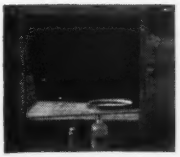
Left: Adjustable Indicator Post.

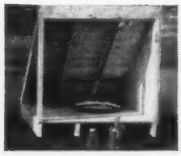
MECHANICAL JOINTS

In addition to regular hub ends and flanged ends, M&H Valves and Hydrants are now furnished with stuffing-box type Mechanical Joints for use with Standardized Mechanical Joint cast iron pipe.

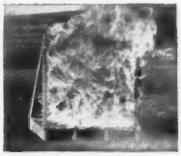
M&H VALVE
AND FITTINGS COMPANY
ANNISTON, ALABAMA

TESTS CONFIRM...

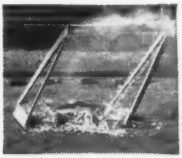




Test structures built of Koppers fire-retardant wood (left) and untreated wood (right) ready for the fire test. Five quarts of kerosene, placed in pans, furnishes fuel for each blaze.



Both structures are quickly enveloped in flame. Treated structure resists fire, but untreated one encourages it, contributes fuel to the fire.



After twenty-two minutes the untreated structure, still burning, is collapsing. Note that in the treated structure, the fire stopped when the fuel burned out.

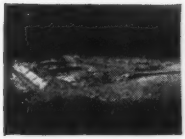
fire retardance of KOPPERS CZC(FR)

Koppers fire-retardant wood is suitable for use as flooring, roofing, sheathing and structural members of industrial buildings, garages, airplane hangars, munitions plants, docks and warehouse buildings, railroad engine houses, and other similar structures. Koppers CZC(FR) treatment has a valuable plus advantage, for it also fortifies the wood against decay and termite attack. Color and paintability are not harmed by the odorless CZC(FR) treatment.

Investigate the possibilities of this new Koppers development. Send for your copy of the booklet, "Koppers Fire-Retardant Wood." Filled with interesting, helpful information.

Right · The treated structure was charred . . . but retained its integrity and strength, as the 800 pound load shows.

Left · Continued burning reduced the untreated structure to ashes.



KOPPERS

KOPPERS PRESSURE-TREATED WOOD

KOPPERS COMPANY, INC.
PITTSBURGH 19, PA.

Insurance Savings Pay for Elevated Tank

When the Barber-Greene Company enlarged their plant at Aurora, Ill., they installed this 100,000-gal. elevated tank to provide a secondary water supply for the automatic sprinkler system.

The primary water supply for the sprinkler system is provided by city water mains. A secondary supply, however, was desirable because of the increased size of the plant.

The new tank has reduced insurance premiums about 30 per cent and will pay for itself out of savings in 10 or 12 years.

Write our nearest office for quotations on tank installations. State capacity, height to bottom and location.

CHICAGO BRIDGE & IRON COMPANY

CLEVELAND	CHICAGO	BIRMINGHAM	NEW YORK
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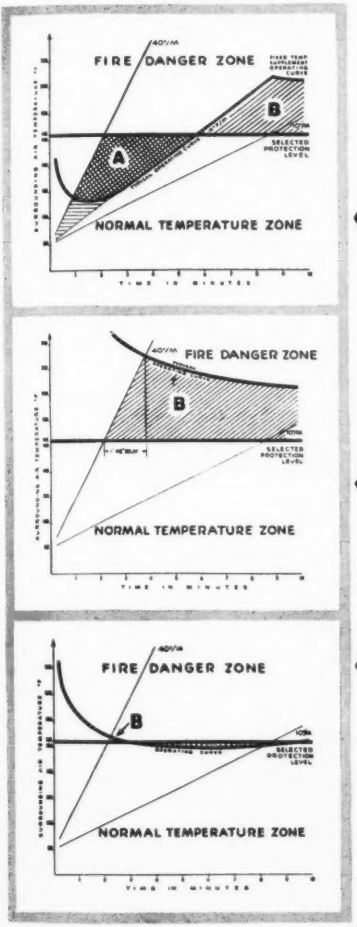
Plants at Chicago, Birmingham, Salt Lake City and Greenville, Pa.



Charts show how only DETECT-A-FIRE signals instantly!

RATE-OF-RISE DETECTOR has serious false alarm zone (a) dangerous unprotected zone (b) even with fixed-temperature supplement.

FIXED-TEMPERATURE DETECTOR permits wide unprotected zone (b) due to thermal lag.

DETECT-A-FIRE makes unprotected zone negligible (b) does away with false alarms.

No false alarms!

No unprotected zone!

No thermal lag!

Approved by Factory Mutual Laboratories, Listed by Underwriters' Laboratories, Inc., for Ordinary and Hazardous Locations Class I, Group D; Class II, Groups E, F and G.

Fenwal

DETECT-A-FIRE

Combines Fixed-Temperature Response with Rate-Of-Rise Compensation for Instant Alarm

SENSITIVE... *but only to heat*

FREE bulletin gives you complete details on amazing Detect-A-Fire. See how you, too, can improve your fire alarm and extinguishing systems. Just mail coupon.

NAME.....POSITION.....

COMPANY.....

STREET.....

CITY.....ZONE.....STATE.....

FENWAL INCORPORATED, 30 Pleasant Street, Ashland, Massachusetts
Temperature Control Engineers

"Automatic" Sprinklers . . . A Vital Business Economy for Industry the World Over

ARE you in a position to definitely measure the over-all cost of destruction, should fire reduce your plant or property to a shambles of twisted steel or broken concrete? We doubt it, for fire loss represents considerably more than is visible in the destruction of buildings, equipment and records. It means the interruption of production and service, the reduction of assets and increased liabilities. It means temporary and perhaps permanent loss of customers. In short, it could well mean the financial ruin of your entire business enterprise.

On the brighter side of this picture of fire destruction stand "Automatic" Sprinklers, industry's most effective weapon against fire. For, "Automatic" Sprinkler systems are supersensitive to the very indication of flame. They make the fire extinguish itself, even before it can make headway. And, on the financial side, "Automatic" Sprinklers, like any other capital asset, can be amortized over a given period of years, with their initial cost ultimately taken as an operating expense.

You and every other executive with an appreciation of business economy must not overlook the importance of fire safety with "Automatic" Sprinklers, *an important investment today . . . perhaps welcomed protection tomorrow.*

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO

"Automatic" Sprinkler
FOR INVESTMENT PROTECTION
DEVELOPMENT · ENGINEERING MANUFACTURE · INSTALLATION

WHY CITIES PREFER GAMEWELL

2 Reasons are—Economy and Dependability

Many Gamewell fire alarm boxes still in use have service records exceeding 70 years, and — Obsolescence, due to the production of later models affording greater protection, not deterioration, is generally the cause of retiring Gamewell boxes from service.

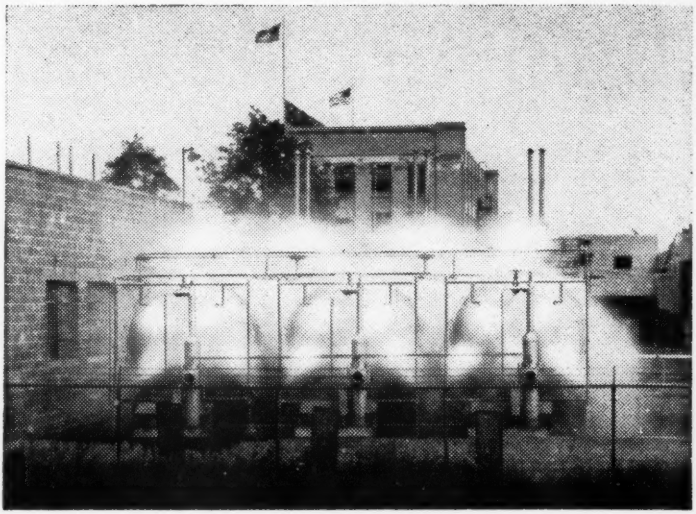
Gamewell Three-Fold Fire Alarm Box

The Standard for Municipal Service

For the protection of the values at risk — human life, property, business and income — adequate fire alarm box distribution is a sound investment.

THE GAMEWELL COMPANY

Newton Upper Falls 64 - Massachusetts



ProtectoSpray

ProtectoSpray is a Grinnell System for the emulsion extinguishment of fires in light and medium oils, the controlled burning of highly volatile liquids, and for the protection of tanks by insulation and cooling.

The ProtectoSpray installation shown above provides protection to propane tanks, pipes and structures by cooling action. Rapid dissipation of heat prevents the development of high temperatures from fires and effectively prevents rapid evaporation of volatile liquids with possible development of bursting pressures.

For complete information on ProtectoSpray and other Grinnell Systems for the emulsion extinguishment of oil fires with water, address Grinnell Company, Inc., Executive Offices, Providence 1, R. I., or offices in principal cities.

GRINNELL SYSTEMS

For Protection Against Fire